The Psychology of Teaching Reading

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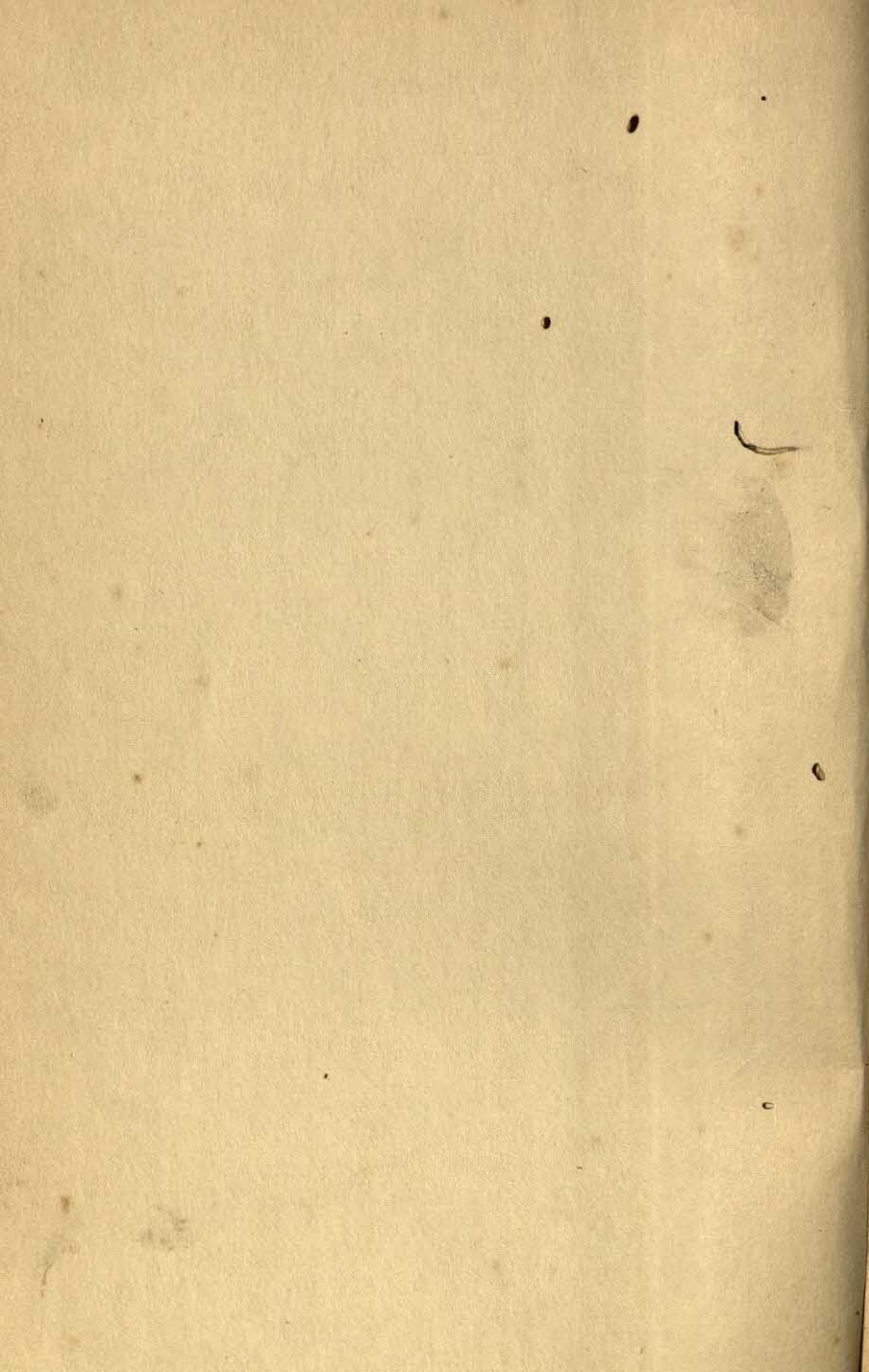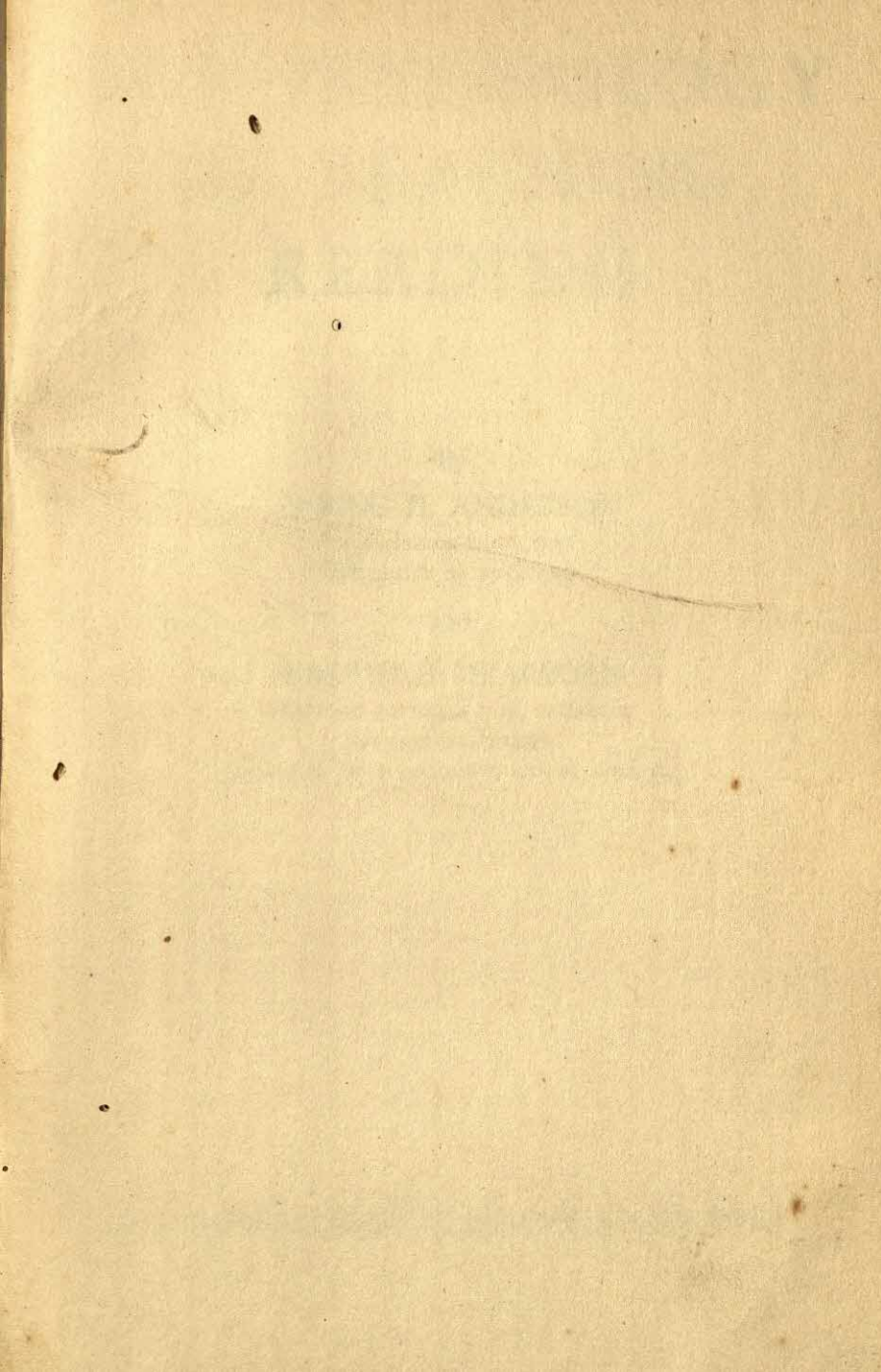Professor of Psychology, Lesley College*

THE PSYCHOLOGY
OF TEACHING
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PREFACE

This book is addressed to the problem of teaching children to read. It is primarily designed as a text for professional courses on the psychology and teaching of reading, but it should also be helpful to experienced teachers who have completed their formal training, and to parents and others who wish to be enlightened on the subject of modern methods of teaching reading.

The emphasis which this book places on the psychological foundations of method distinguishes it from many others in its field. Too often in the past, books on the teaching of reading have treated the subject without an adequate account of the psychological rationale of the techniques proposed. Our principal purpose has been to review the psychological evidence which provides the very basis of method. In short, it is our firm conviction that teachers will achieve better results if they understand the "why" as well as the "how" of their techniques. However, while we have used the psychological approach, we have taken care throughout to illustrate the principles in question by means of frequent references to case material and actual classroom performance.

The results of recent investigations of child development are discussed at length because of the influence which these studies have exercised on school practice. The attention which we have given to the developmental aspects of reading amounts to a central theme. While thus stressing the importance of "growing into reading," the authors do not lose sight of the fact that it is with the *learning* processes of the child—motivational, emotional, and cognitive—that the teacher is quite as much concerned.

We have also devoted a great deal of space to a review of eye-movement studies and short-exposure experiments. This research has thrown light on the fundamental nature of the reading process, and the results permit immediate classroom application. Other research, in more specialized areas, has been less

extensively treated, e.g., the recent work on readability, format, typography, and illumination. We have concentrated on the psychological facts which apply most directly to the teaching process, and only those.

We wish to take this opportunity to thank the many authors and publishers who have granted us permission to quote and reproduce material from their works. In each instance we have given credit by means of a complete reference to the source. We owe a special debt of gratitude to Miss Charlotte Hardy, teacher of the first grade in the University of Michigan Elementary School, whose helping hand made Chapter 7 possible. The test exercises exhibited in this chapter are the work of Mrs. Helen Donnelly Leverett. We have her to thank for permission to use these materials.

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February, 1952

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READING AS GROWTH

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INTRODUCTION

"Don't they teach reading in the schools any more?" asked the anxious mother of a chubby tyke of seven. The youngster was placed in the second grade, but had not yet learned to read preprimer material. The child's mother apparently had learned to read in the first grade, and she doubtless suspected that modern schools were lax in their methods of teaching reading.

There is a belief in some quarters, however, that teaching methods are not the answer to the reading problem. The ideas stressed in these circles are that reading is a part of total growth and intimately related to it, that reading is an individual matter, that all children cannot be expected to achieve alike, and that reading is rooted in biology as well as in psychology and education. In support of the importance of biology, evidence is offered as to the difference in reading achievement between boys and girls, and as to the relation of reading achievement to the physiology of the mother, to the family pattern of brothers and sisters, and to secondary sex characteristics.

These views are an expression of the _growth philosophy_ or of the _organismic hypothesis_.[1] Many of the changes in the way in which reading is taught in the schools nowadays have been brought about through this new emphasis on growth. In this introductory chapter, therefore, the major concepts of the growth philosophy will be reviewed, as a means of throwing light on some of the newer trends in the teaching of reading. It

[1] For those who are not on speaking terms with this organismic hypothesis we can pass on a definition which was found in a student's paper. It is one of those great simplifications of knowledge which only the mind of a student could accomplish: "Growth starts at the head and goes down and out."

should be kept in mind that an effort is here made merely to account for this recent stress on growth. Growth (or maturation) doubtless does influence a child's achievement in reading, but reading is not a matter of growth alone. Even the most enthusiastic advocates of the growth philosophy admit that in the final analysis the child *learns* to read. One should not be misled by the vocabulary which has slipped into this field. Such expressions as "growth in reading" represent just a manner of speaking. "Growth," as applied to reading, can only be defined in terms of an interaction between natural growth and learning. What the matter amounts to is that schools in the past have often placed too much faith in methods and have not paid sufficient attention to the contribution of growth to learning. This is not the same as saying that methods can be relegated to a position of complete desuetude. The teacher would be lost without the tools of her trade. It is hoped that these comments will reassure the reader that in this first chapter we are not telling the whole story. Such questions as the relation of growth to learning and the relation of methods of teaching to both learning and growth will be discussed at length in later chapters.

THE RELATION OF READING TO TOTAL GROWTH

Much of the current interest in the growth philosophy stems from research which Professor Willard C. Olson and his associates have conducted in the University Elementary School at the University of Michigan. This research has featured the *longitudinal* method. In this method, periodic measurements are made of the same group of children over a period of years. These measurements at Michigan have included height, weight, dentition, strength of grip, ossification of wrist bones, mental growth, and school achievement. The relationship between these attributes has been the problem of many of the Michigan studies.

The Unified Character of Growth.—It is a common observation that children of any age group are not alike. They are not alike with regard to various physical characteristics, nor are they alike in learning ability. Periodic measurements of the

mental and physical growth of the same group of children reveal that individual differences in these measurements tend to persist through time. Such measurements also disclose that growth manifests some unity when viewed as a whole.

The unified character of growth is illustrated on Figures 1 and 2. Repeated measurements were made of these two boys. The results of the original measurements were then converted into age units,[2] so that on the figures height in inches appears as height age (HA), weight in pounds as weight age (WA), number of permanent teeth erupted as dental age (DA), stage of ossification of wrist bones as carpal age (CaA), and strength of grip in kilograms as grip age (GA). Intelligence-test performance is shown as mental age (MA), and reading achievement as reading age (RA). On the figures these growth ages have been plotted against the chronological ages at which they were obtained. The curves have been constructed by connecting the points for each attribute. The straight diagonal line represents average growth. The designations B1 and B28 refer to relative standing in a group of twenty-eight boys who were ranked according to organismic age at chronological age nine. *Organismic age* is a term which Olson and Hughes (248) have coined to represent the average of all growth ages for one point in time.

The chief observation to be made is that the curves for B1 run above the norm throughout the period of development shown, while those for B28 tend to run below the line of average development. Both charts reveal a gathering together of the curves, and in each instance reading falls within the area of total growth. Fuller (110) has reported the cases of two girls who illustrate the same conditions. The pattern tends to be unified in the majority of cases. As Olson and Hughes have stated, "the various attributes in an individual tend to cluster about a center of gravity of growth of that individual and . . . the freedom to vary is restricted" (250, p. 55). The tendency for achievement, as here illustrated by reading, to fall within the

[2] These conversions are made from tables or standards based on the average attainments of children at various chronological ages. For example, a weight age of ten means that a child's weight is equal to that of the *average* ten-year-old child of the same sex.
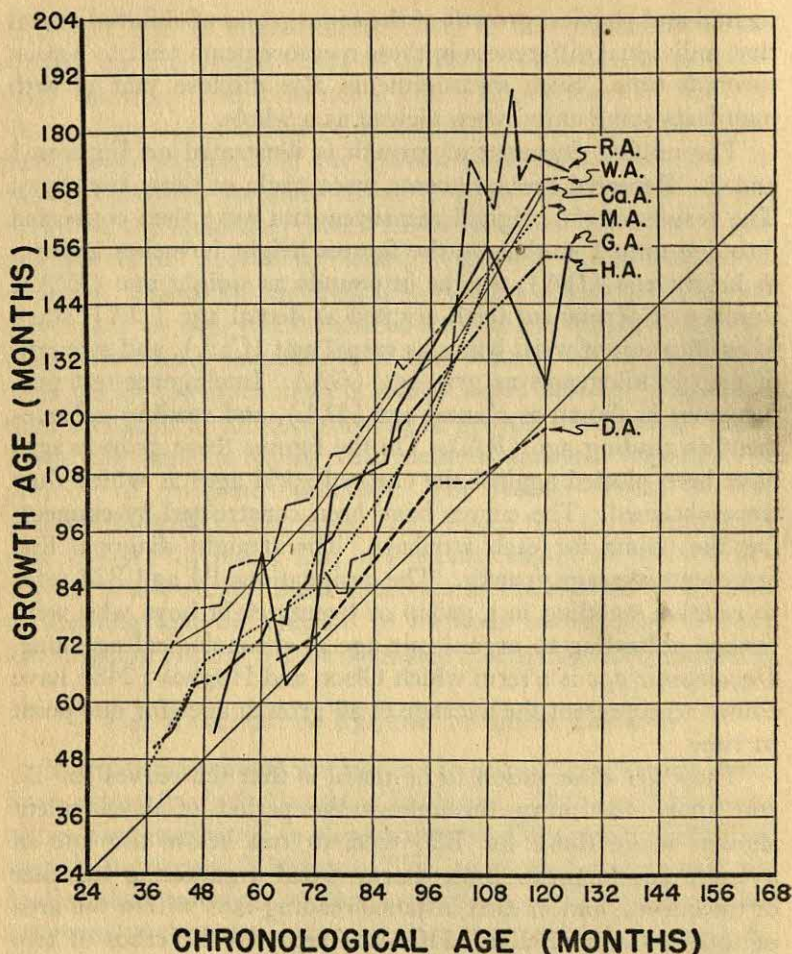
Fig. 1.—Growth of a boy at a high level (B1). From Olson and Hughes (250, p. 54), by permission of *Childhood Education*.

area of total growth has led to the further generalization that *"achievement is a function of the organism as a whole"* (249, p. 205). There are exceptions to the rule. Some children present a pattern of split growth in which the various attributes fan out and cover a wide band. Olson and Hughes have described such cases as being "biologically or physiologically awkward"
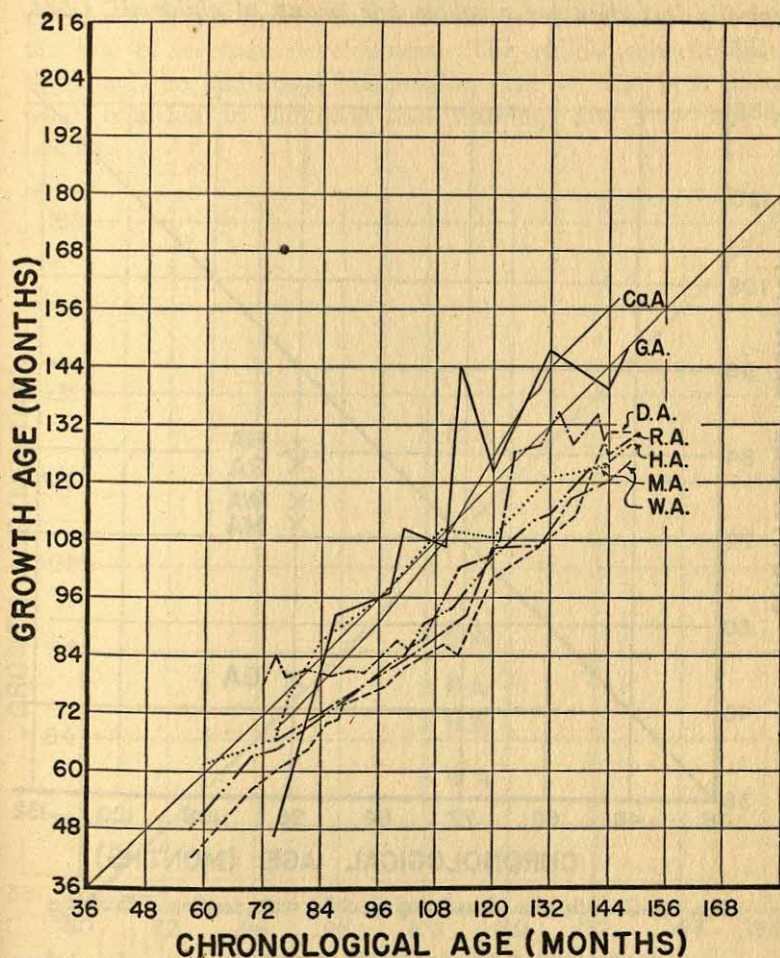
Fig. 2.—Growth of a boy at a low level (B28). From Olson and Hughes (250, p. 54), by permission of *Childhood Education.*

(251). Split-growers often adjust poorly to school (39). Other children may be growing in a harmonious fashion, except for one strand, like reading, which may lag behind the rest of the attributes. One such case is shortly to be discussed. Certainly we can all accept this final generalization without qualification: "*The variability of the values for a given individual is*

typically less than for a whole age group of children" (249, p. 202).
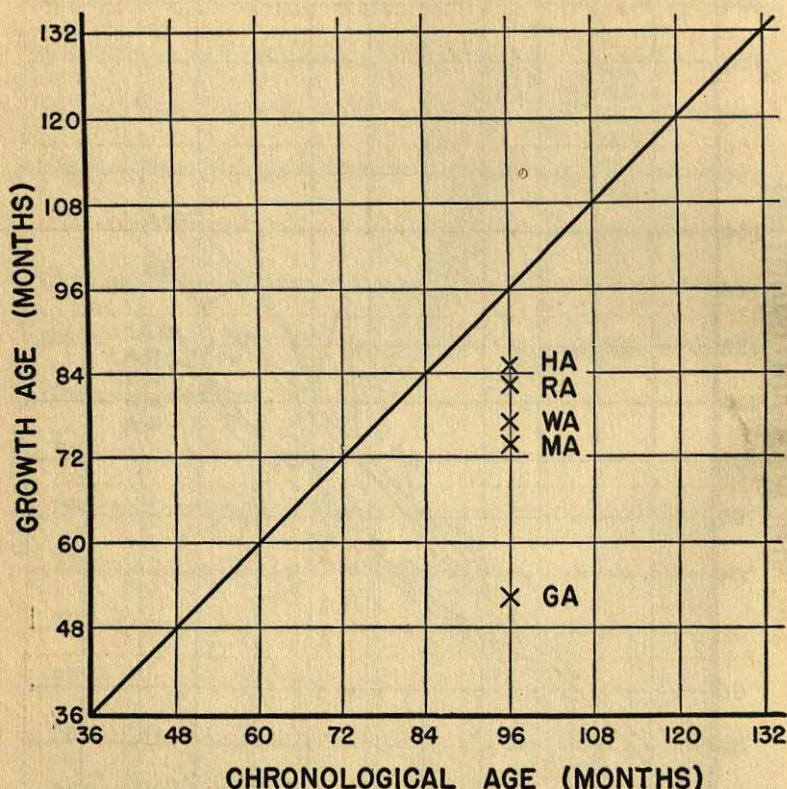
FIG. 3.—Growth of a slow-learning child with reading difficulty.

Reading as Related to Growth at a Low Level.—Doubtless there are cases of individual children whose retardation in reading is part and parcel of a retarded pattern of total growth. One such case was that of a shy and withdrawn boy of eight. At the time when his case was studied, the child was repeating the first grade, but he remained in the immature group of his class. Longitudinal growth data unfortunately were not available in his case, but it was possible to obtain a number of measurements for one point in time. The results of these measure-

ments are shown on Figure 3. All the growth values are below
the line of average development. The child's school record
contained the additional information that he "has been some-
what retarded in dentition and walking, and very late in
talking."

GROWTH AGE (MONTHS)

156
144
132
120
108
96
84
72
60

× M A
× G A
× R A
× H A
× W A

60   72   84   96   108   120   132   144   156

CHRONOLOGICAL AGE (MONTHS)
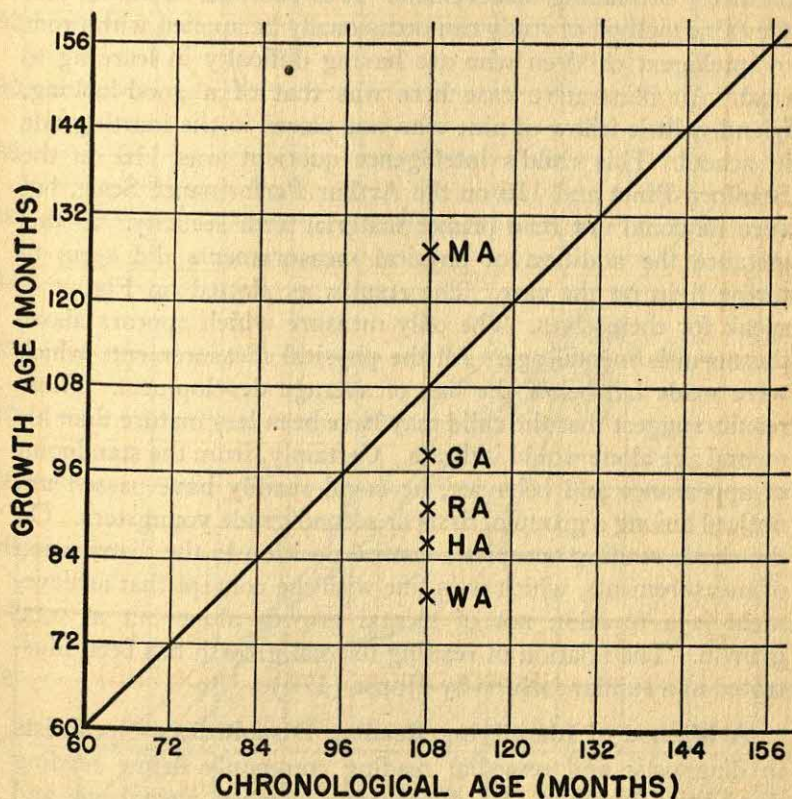
Fig. 4.—Growth of an intelligent child with reading difficulty.

It can also be reported that this child had been delayed in
developing hand preference. In other words, all the evidence
points to a retarded pattern of total growth not unlike that for
B28 above. In terms of his total growth pattern, the boy was
probably reading as well as could be expected. He was definite-
ly not a remedial case.

In the ordinary course of events, this child's problem would have been diagnosed as one of simple mental retardation, inasmuch as his intelligence quotient was only 75. How much the physical measurements may have added to this diagnosis is a question. Mental-test performance remains the one best predictor of reading achievement. It is possible, however, that the same method of study can occasionally be applied with profit to intelligent children who are having difficulty in learning to read. An illustrative case here was that of a good-looking, friendly, little fellow of nine who was placed in the fourth grade in school. This child's intelligence quotient was 118 on the Stanford-Binet and 116 on the Arthur Performance Scale, but even he could not read primer material with security. In this instance the addition of physical measurements did seem to throw light on the case. The results, as plotted on Figure 4, speak for themselves. The only measure which appears above the norm is mental age. All the physical measurements which were made fall below the line of average development. These results suggest that the child may have been less mature than his mental age alone would indicate. Certainly, from the standpoint of appearance and behavior, he could readily have passed unnoticed among a group of first- or second-grade youngsters. On the chart, reading occupies a central position in the distribution of measurements, which is in line with the concept that achievement is a function not of mental growth alone but of total growth. The relation of reading to total growth has been illustrated in a similar fashion by House (176).

A Method of Identifying Reading Disabilities.—Specialists in diagnostic and remedial reading commonly define reading disabilities in terms of a discrepancy between mental age and reading age. If the reading age is appreciably below the mental age, the child is regarded as a reading problem. In such cases, moreover, mental age is taken as a measure of what should be expected of the child in the way of reading achievement. These practices may be questioned in the light of the present discussion. The relationship between intelligence and ability to read is far
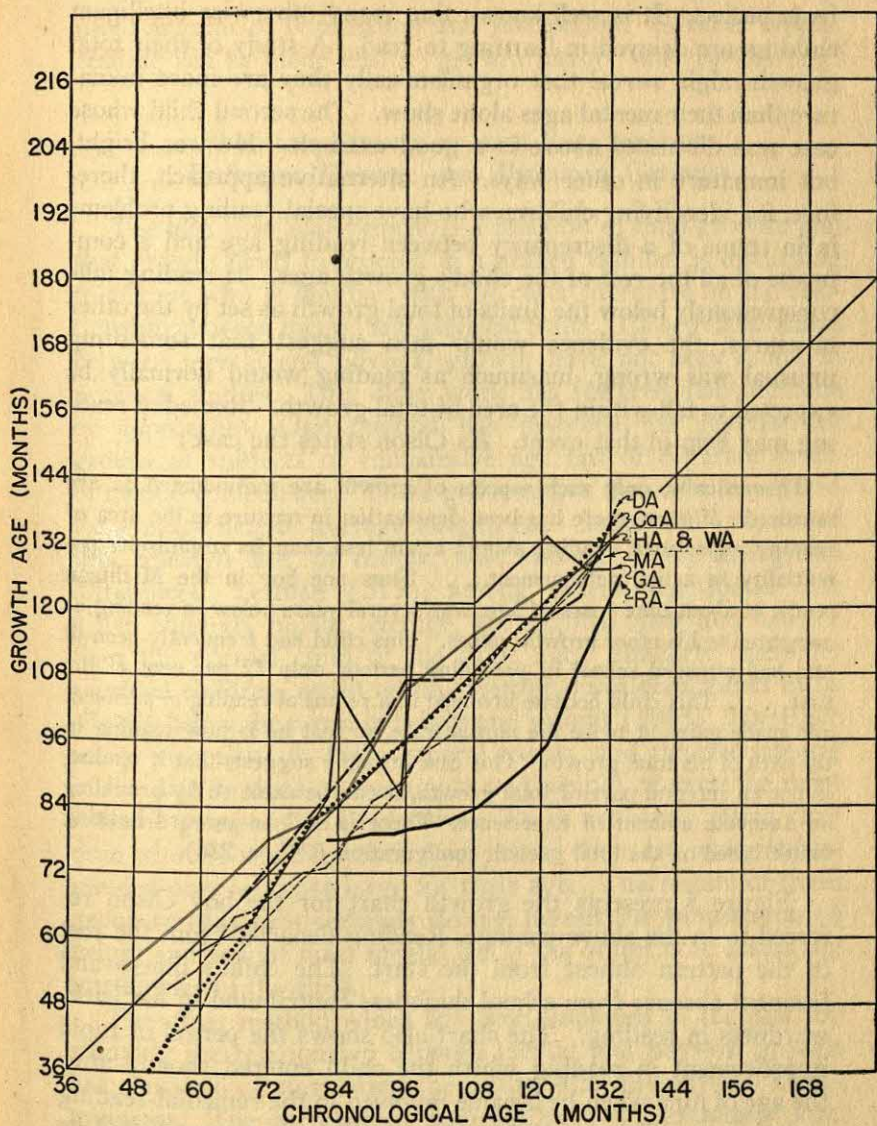
Fig. 5.—Growth of a retarded reader in the elementary grades.

from perfect. It is well known that many otherwise intelligent children are delayed in learning to read. A study of their total growth might reveal that organismically they are more immature than their mental ages alone show. The second child whose case was discussed above is a good example. He was bright, but immature in other ways. An alternative approach, therefore, for identifying children who have special reading problems is in terms of a discrepancy between reading age and a composite of all the rest of the child's growth ages. If reading falls conspicuously below the limits of total growth as set by the other measures, the evidence would then suggest that something unusual was wrong, inasmuch as reading would normally be expected to fall within the area of total growth. Remedial reading may help in that event. As Olson states the case:

> Theoretically, only such aspects of growth are individuated as are nurtured. If, then, there has been deprivation in nurture in the area of reading experience, reading should attain less than its organismic potentiality in actual achievement. . . . Thus one boy in the Michigan study, at about nine years of age, was several years below in reading as compared to his other growth values. This child had frequently been ill and had attended school in preceding periods only 72 per cent of the time. . . . This child became involved in a remedial-reading experiment and made gains at twice the normal rate, so that he is now reading in the area of his total growth. This case strongly suggests that if reading is not an integral part of total growth, it can be made so by providing an adequate amount of experience. There is still an upward limiting factor based on the total growth configuration (241, p. 236).

Figure 5 presents the growth chart for the boy Olson referred to in the above passage. Reading departed from the rest of the pattern almost from the start. The child's illness and frequent absence from school doubtless contributed to his backwardness in reading. The chart also shows the period of rapid improvement in reading which the child entered shortly after the age of nine when he became involved in the remedial-reading experiment. The remedial reading apparently accomplished its purpose. This case is a good example of the fact that children will not make normal progress in reading if deprived of the

usual amount of stimulation and instruction. In other words, reading can be made into a "growth factor" only by learning!

Previous Studies of the Relationship Between Mental and Physical Growth

The idea that achievement is a function of total growth, and that growth tends to proceed in a unified fashion, is disturbing to anyone who is familiar with the older literature on the relationship between mental and physical traits. Close relationships between mental and physical growth have not been found in previous studies. This older work has featured two methods or approaches. One method has involved the selection of groups of subjects of comparable age but of different levels of mental competence. These groups have then been compared for average height, average weight, etc. Some of the results of this research are, of course, well known. There are group differences. Terman (315), among others, has found that gifted children, on the average, are slightly taller and heavier than the normal child of the same age. Similarly, mentally retarded children, again on the average, have been found to be slightly below the norm in height and weight (109). There are many exceptions to these general trends, and the overlapping in the distributions of the height and weight of even the most extreme groups is still extensive. There are many gifted children who are small for their age, just as there are many feeble-minded ones who are large for their age. The results of these group comparisons certainly do not permit the substitution of height and weight for a mental test if the object is to assess the intelligence of the child.

The other method which has been employed in the past for studying the relationship between mental and physical growth has consisted of correlating the mental with the physical measurements. The correlations reported have run extremely low. Murdock and Sullivan (237) found a correlation of only .15 between measurements of height and weight and ratings of intelligence. For those in the group who had intelligence

quotients above 100, the correlations ranged from .04 to .06, indicating virtually no relationship. For those whose intelligence quotients were below 100, the correlations reported varied between .13 and .14. These results have been taken to mean that the relationship between height and weight measurements and intelligence ratings might be a trifle closer among the dull than among the bright. Doll (88) obtained correlations ranging from .31 to .47 between the height and weight and the intelligence of subnormal and feeble-minded boys and girls. One of the more recent studies is that of Abernethy (1). Her subjects represented a high economic and scholastic level and varied in age from eight to seventeen years. Correlations were computed separately by age and sex. The correlations between height and intelligence ranged from .07 to .33 for the boys, and from .07 to .21 for the girls, and between weight and intelligence, from .10 to .27 for the boys, and from —.08 to .20 for the girls. The intelligence test used was Freeman's point-scale. A correlation of .22 was found between height and intelligence, and one of .14 between weight and intelligence for 533 sixteen-year-old boys in the Harvard Growth Study (77). The *percentage* of increase in height and weight during the prepubescent growth spurt bears no significant relationship to the gains achieved in reading and arithmetic during the same period (167).

Prescott (263), Lowell and Woodrow (211), and Abernethy (1) have found that the correlations between mental development and the stage of ossification of the wrist bones are just as low as those reported between mental development and growth in height and weight. The median correlation between carpal index and intelligence in Abernethy's study was .12 for her boy groups and .06 for her girl groups. West (352) measured the percentage of carpal growth in terms of estimated adult status and found no significant relationship between this measure and mental-test performance.

Data reported by Bean (19), Matiegka (214), Lowell and Woodrow (211), and Cattell (56) indicate that the same positive but low relationship exists between dentition and intelligence as between the latter and the other physical measurements.

The Concept of Multiple Causation

In the light of this failure of previous studies to establish close relationships between mental and physical growth, it is readily understood how most observers might feel uneasy about attaching any great significance to physical measurements in the case of children who cannot read. Reading is an aspect of mental growth, and, if there is a marked simultaneity or homogeneity of mental and physical growth, it must mean that practically all short and lightweight children are either dull or poor readers or both. Yet it is obvious that this generalization cannot be made. One critic disposed of the record shown on Figure 4 by remarking that the child was just small, and that the physical measures had nothing to do with his maturity.[3] This remark may represent a too narrow view of the matter. As Olson and Hughes write:

The question is frequently asked, "How many measurements, and which ones, are needed to determine an adequate organismic age?" Unfortunately there is no easy answer. If a person takes but one measure, he has some idea about the growth of the child; if he takes two, he has a more complete description; if he takes three, he has a still better one, etc. Theoretically, one would have determined a stable organismic age when no further addition of values would cause it to fluctuate in a significant manner. The generalization that achievement tends to be an expression of total growth has occasionally been challenged by the worker who has collected an additional physical measure or two, such as height and weight. Experience reveals that the gap tends to be filled in as one gathers additional and sometimes more subtle measures of growth.

Theoretically, the measures taken should represent an inclusive theory of the organism. A complete account might include measures of emotionality, social adjustment, gross bodily development, circulation, efficiency of sense organs, development of educational and physical skills, and measures of metabolic function. Practically, the work to date has been more limited (248, p. 526).

[3] The age-unit method of plotting is limited by a failure to take into account individual differences in body build—the small child who remains small and the large child who stays large. A small child may be growing just as rapidly as a large child, but not show it on an absolute scale, which makes the finding that achievement is a part of total growth (as plotted by the age-unit method) seem even more surprising.

It is unfortunate that measurements of dental age and of carpal age were not obtained in the case of the child represented by Figure 4. The addition of other measurements might have served to complete the pattern (as suggested in the above quotation) and to reveal more clearly the sum total of the child's immaturity.

It can further be stated that children differ not only in the level of growth but also in the details of the total pattern. Evidence exists, moreover, that first one attribute and then another may develop at the more rapid rate in the same child. Figures 1 and 2 remain a good illustration here. An inspection of these figures will show that the various attributes are not arranged in the same relative position on the two charts. Closer examination will reveal how the different attributes on the same chart overtake one another from time to time. Olson does not believe that the "statistics of intercorrelation . . . do justice to the patterning of characteristics in a child" (246, p. 182). The over-all picture may bring out *patterns* of relationship which are not revealed by correlating single measurements with each other. The concept of multiple causation refers to this molar approach in the study of growth.

The Management of Slow-Growing Children

Slow-growing children need a school practice that will allow them to proceed through school at their own rate and pattern of growth. This suggestion implies that children stay more or less permanently with their age groups, quite irrespective of academic achievement, and that the standards for the completion of the elementary school or graduation from high school shall academically not be the same for all. Chronological age has virtually become the basis for promotion in elementary schools. High schools, for the most part, continue to operate according to a more selective plan. Under the system proposed, instead of repeating work, with each new term the pupil begins his work at the level he has previously attained. This procedure is an application of what Olson and Hughes (250) have termed the "pacing" principle, as contrasted with methods which seek

to bring all children up to certain arbitrary passing standards. The latter methods can only result in frustration in the case of retarded learners who are already functioning at the limit of their capacity. Failing such children usually adds insult to injury.

Continuous Promotion and Pupil Progress.—What, after all, is the matter with a pupil's repeating a grade? First and mainly, the psychological effects on the child's personality. Secondly, studies have shown that about two-thirds of repeaters do little or no better on the second try, and further, other studies prove that when pupils who would ordinarily have been kept back are given a probationary period in the next grade, a considerable proportion of them manage to stick there, and finally, greater scholastic gains are made by pupils who *are* promoted than by comparable pupils who are not promoted (certainly in part due to the discouragement and chagrin of the latter group and the encouragement given the former group). These findings clearly imply that, in general, school authorities will be on safe ground to pass all children to the next grade. Exceptions do occur, and occasionally the best interests of all concerned may be served by reclassifying the child with a younger age group, but this should only be necessary when the child is extremely immature. The youngster whose problem was discussed in connection with Figure 3 may have been such a case.

Parental Reactions to Reading Failures.—Pressure at home should also be avoided in the case of slow-growing children. The parents of the youngster whose case was discussed in connection with Figure 4 were told that the child had a good mind, that he was immature in other ways, that reading was a part of his general immaturity, and that he would come out of it (the reading doldrums) with room to spare later on. The father, as much as to see the child in his own image, merely said, "I was the same way at his age." That is the spirit that counts. All children are not that lucky. Some parents become embarrassed when their youngsters do not measure up to their classmates in school. Such parents, intentionally or not, tend to take out their disappointment on the children, and the latter then

become petulant and difficult to handle, with the result that the whole household is upset. In a study in which the parents of 100 retarded readers of normal intelligence were interviewed regarding their reactions to the failure of their children to make the grade in reading, Preston (265) found that "worried," "anxious," "distressed," "upset," "greatly concerned," "troubled," "disturbed," "baffled," "shocked," "desperate," "despairing," "hurt," "discouraged," "disheartened," "furious," "annoyed," "sarcastic," "impatient," "provoked," "angered," "severe," "disgraced," "resentful," "chagrined," "disgusted," and "mortified" variously described the feelings and reactions of most of the parents in the group. The "seething emotions" of the parents were frequently expressed in hostility toward the children, who were called such things as "lazy," "stupid," "dumb," "boob," "dunce," "simp," "bonehead," "big sissy," "blockhead," "fool," "idiot," and "feeble-minded." The children were not unintelligent, of course, because only pupils of normal intelligence were included in the study, but it would not take much of that kind of treatment to make the youngsters believe that they were "dumb" or stupid. The reaction of the children is at times extremely pathetic. Young has described the case of one boy who considered "putting his eyes out, since then he would not be expected to read and so would not feel disgraced by his stupidity" (366, p. 248).

The Relation of Reading Disabilities to Emotional Disturbances.—Many psychologists have reported that emotional disturbances often occur together with reading disabilities. In a study of the relation of failure in reading to school adjustment, for example, Gates (119) found the following emotional maladies among a random sample of 100 disabled readers:

10 cases of nervous tension, including such symptoms as restlessness, nail biting, insomnia, and stuttering.

16 cases of defense behavior, involving such things as loud talk, defiance, and sullenness.

18 cases of aggressive reactions, such as mischief-making, playing practical jokes, stealing, destroying property, cruelty, and bullying.

26 cases of recessive behavior as evidenced by mind wandering and daydreaming.

14 cases of avoidance reactions, such as isolating oneself from the school group, joining outside gangs, and truancy.

33 cases of submissive or surrender reactions as expressed by indifference, inattentiveness, and apparent laziness.

35 cases of extreme self-consciousness, involving such problems as becoming easily hurt, blushing, and having inferiority feelings.

While emotional maladjustments often accompany reading disabilities, it is not always easy to tell which of the two problems is cause and which is effect, or whether both spring from a common source. It seems probable, however, that the emotional difficulties are often attributable to the attitudes which parents have toward reading failures. As Preston's study indicates, parents are not likely to be good sports about the matter. In fully two-thirds of the 41 reading cases studied by Young, unnecessary pressure on the part of both parents and teachers contributed to the appearance of emotional disturbances in the children. Efforts to coerce the children to read, unfavorable comparison with other children, and overemphasizing the importance of reading were the principal sources of this pressure. The children tended to develop feelings of inferiority and insecurity, as well as such problems as stuttering, nervous twitching, tics, enuresis, thumb sucking, stealing, lying, and truanting from school.

The above studies stress the fact that failure in reading is often a source of friction at home. The emotional complications appear as a result of the parents' reactions to the reading failures. By way of comparison, Missildine (230) emphasizes the importance of emotional disturbances as causes of reading disabilities. The subjects of Missildine's study were thirty disabled readers who had intelligence quotients of 90 or better, and normal eyesight and hearing. All the children were emotionally disturbed and under psychiatric care. In almost all cases, a neurotic parent or two lurked in the background, and the emotional difficulties of the children were attributed to the insta-

bility of the home. Since in most instances the trouble existed before the children entered school, the reading problems which the youngsters later developed were interpreted as representing another symptom of the underlying emotional distress which they already suffered. Schoolwork nevertheless became a sore point in many of the homes after the children reached school age, as witness the following thumbnail sketches of a few of the mothers in the group (230, pp. 266-67).

1. Nervous, and feels that the world is against her, hollers at the patient, hits him when his homework isn't satisfactorily done.
2. Nervous, irritable, hypochondriacal, screams frequently when angry, punished patient severely over homework.
3. Aggressive, nagging, criticizing, and calls patient "dumb"; did not want the child originally.
4. This mother hounds the patient about his schoolwork to the point where the teacher asked her to desist.
5. Very stern with child, pushes him with schoolwork, and often punishes patient because of it.
6. Perfectionistic, aggressive, with strong college ambitions for the boy.

Whatever the previous emotional condition of the children, such treatment can only serve to add to their woe and to increase the symptoms of their maladjustment. Ten of the mothers were overtly hostile to their children; ten other mothers, while not overtly hostile, were tense, coercive, and criticizing persons. The children, for their part, were insecure, restless, and emotionally disturbed. As one source of conflict between the parents and child, the failure of the children to read added to the tension in the home and contributed to their total adjustment problem. The hostility of the parents is occasionally so great that the children develop deep feelings of rejection. Rejected children are prone to turn rebellious and defiant, and they often seek ways to retaliate for the injustice shown them. If failure in reading is a source of friction at home, they may turn it into

a countermeasure and actually flaunt their inability to read as a means of expressing aggression and tantalizing the parents.

The Relation of Reading Disabilities to Juvenile Delinquency.—Research (104) has shown that failure in reading is a conspicuous problem among juvenile delinquents. Which is cause and which is effect here? This, again, is a large order, but it is of interest to report the gist of a letter which has recently come to hand from an individual who is more than ordinarily concerned with the question because of the nature of his work. He is probate judge for one of the counties of Michigan. This gentleman has discovered that many of the children who come before his court cannot read, and he has arrived at the theory that in some cases the reading disability may be at the root of the behavior disorders which the children develop. His reasoning is briefly as follows: After failing to learn during the first three or four years in school, the child becomes restless, inattentive, and, feeling socially displaced, begins to engage in problem behavior in order to attract attention and to maintain his position with his classmates. The teacher is puzzled, and being overloaded and not trained to deal with the child's difficulty, reports to the principal; and through the principal, the parents are called in, and they are ordinarily of even less help than the teacher. Failing any other solution, the parents and teacher become stern with the child and start punishing him for his inability to read. The pressure to read is increased, and the child is placed under heavy emotional strain by the threatening nature of his situation. He begins to resent his parents and teacher, things go from bad to worse, and the next thing we know we have an incorrigible problem child on our hands.

This is a good analysis of some cases, but the remedy is not so simple as might appear. This judge believes that the way to handle the situation is to provide all children who suffer reading disabilities with an adequate diagnostic and remedial reading service before these more serious behavior problems have a chance to get started. This proposal involves many practical

difficulties, not the least of which is that the parents may need more remedying than the child. Prevention in these cases will be the better assured by helping parents and teachers to avoid the complications which come from injudicious reactions to the difficulties of children in learning to read. Ways must be found (as in the account of Miss T in Chapter 7) to control the pressures and other sources of disturbance above described.

Nondirective Therapy and the Disabled Reader.—One of the innovations of modern psychology is the use of nondirective or play therapy in the case of children who are emotionally distressed. Axline (15) has reported the results of a study in which these methods were employed with a group of 37 poor readers or nonreaders in the second grade. Many of these children were also emotionally disturbed, and the purpose of the study was "to determine what results could be obtained by a therapeutic approach, with the objective, first of all, a better adjustment of the children; happier children, relaxed, unhurried, natural children in the kind of situation that would free the capacities within each one, that would help the children gain a better understanding of themselves and so become better able to help themselves" (15, p. 62). The class procedure, therefore, was designed "to give the children ample expression through the mediums of art materials, play materials, free dramatics, puppet plays, music, creative writing (dictating their own stories), telling stories they made up themselves, listening to stories, taking trips, sharing experiences, keeping the bulletin board up to date and alive, and living together in an atmosphere of complete acceptance" (15, p. 63). This indirect approach operated not only to promote better emotional adjustment, but it also served to relieve the children of their reading problems. Comparable results have been reported by Bills (26). The evidence in this field suggests that when reading disabilities are complicated by emotional problems, nondirective play therapy may have more remedial value than therapy directed at reading itself, which too often constitutes just another threat to security. It remains only to add that it would help all concerned if parents

were equally sympathetic in their approach to the nonreader, and were willing to accept the child just as he is.

THE RELATION OF READING TO PHYSIOLOGICAL MATURATION

Olson (241) has reported that secondary sex characteristics tend to appear earlier in growers of high status than in those of low status. Physiological maturation thus becomes involved in the concept that reading is an aspect of total growth. It has been found, moreover, that a relationship exists between the physiology of the child and that of the mother and father. For example, mothers who menstruate for the first time at a late age tend to have daughters who are likewise delayed in the time of their first menstruation; mothers who experience the menarche early, tend to have daughters who also experience it early (135). Indirectly, therefore, even the physiology of the parents becomes involved in a study of the child's growth in reading.

The Deep-Seated Nature of Growth.—The relation of reading to total growth, including sex maturation, may be illustrated by reference to Figure 6. This figure shows the longitudinal growth curves in reading for two girls who are designated A and B on the chart. These girls attained final equality in reading, but by widely different paths. Child A maintained a high level of performance throughout, whereas Child B was delayed in getting started, but then made rapid progress. On repeated tests over the years, both children have been above average in intelligence, the most recent intelligence quotients reported in Olson's account of these cases being 119 for Child A and 124 for Child B. Obviously the difference in the pattern of the growth curves in reading is not due to a difference in intelligence. Other factors were doubtless at work, but let us leave it to Olson to tell us why these children differed as they did:

The investigator or teacher who is accustomed to looking at only a single strand, such as reading, would be inclined to say that Child B, at ages seven, eight, and nine, must have been a case of reading disability and that instruction or some other factor must have been at fault.
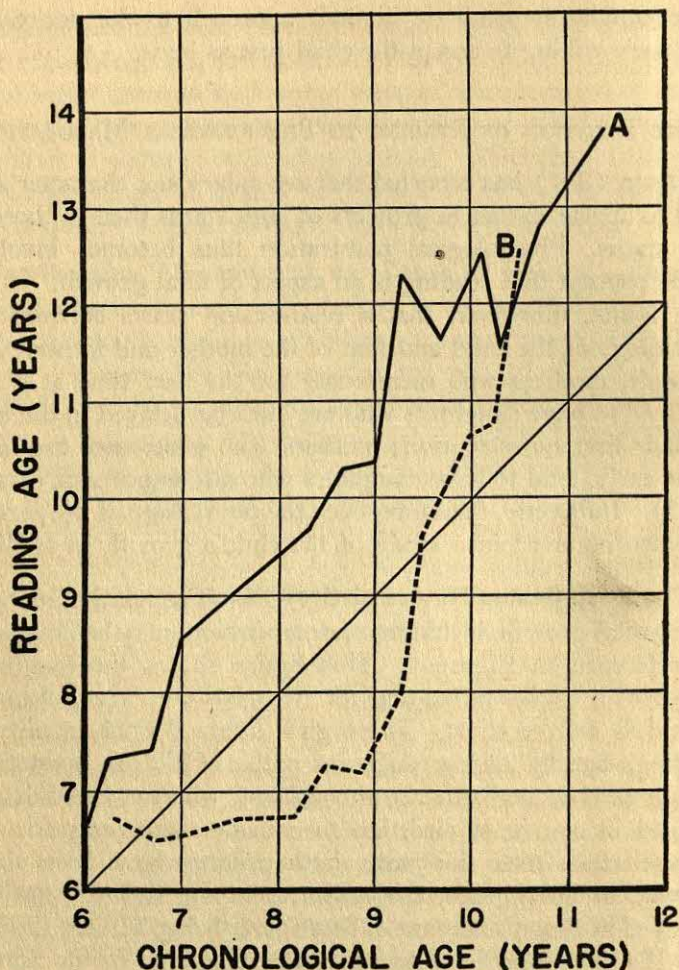
FIG. 6.—Contrasted patterns of growth in reading for two girls of equal intelligence but unequal total maturity. From Olson (242, p. 4), by permission of the Michigan Education Association.

The investigator of growth would not jump hastily to such a conclusion. The two girls show important differences in their pattern of growth as a whole (242, pp. 4-5).

Table I compares the total growth of the girls when each was nine years old. At this chronological age, as indicated by the

TABLE I

GROWTH COMPARISONS IN MONTHS FOR CHILD A AND CHILD B
WHEN EACH WAS 108 MONTHS (9 YEARS) OF AGE

Measure	Child A	Child B
Mental Age	133	123
Reading Age	125	89
Height Age	130	106
Weight Age	148	102
Dental Age	94	103
Carpal Age	132	108
Grip Age	118	130
Organismic Age (average of ages) ..	126	109

From Olson (242, p. 5), by permission of the Michigan Education Association.

average of the growth ages, Child A was actually the older organism by almost a year and a half. Her greater maturity was reflected in her greater achievement. Olson goes on to say:

The accumulation of records of the foregoing type gives the investigator of growth a time perspective. He cannot become much excited about giving special remedial attention to a child, such as B, when he has watched other children follow similar paths. He knows that the individual nature of the growth curve is related to the age at which a child is to become physiologically mature, to the age of physiological maturity of the father and mother, and that eccentric curves tend to run in families. Thus axial and pubic hair were present in Child A at age nine, while equal development does not occur in Child B until age eleven. The menarcheal age for the mother of Child A was fourteen, while that for the mother of Child B was seventeen (much delayed). To study the inner mysteries of growth and education, one must perforce also study the family (242, p. 5).

Interestingly enough, similar differences existed between the children represented on Figures 1 and 2. Child B1, the grower of high status, exhibited the first signs of pubic hair at 108 months, while the signs of pubic hair had not yet appeared in the slower-growing B28 at 150 months. The mother of B1 first menstruated at age eleven, the mother of B28 at age fifteen.

B1 weighed nine pounds at birth and was breast-fed for five months; B28 weighed only four and a half pounds when born and was breast-fed not at all. An additional complication in the latter case is that the child was premature in terms of weight. In a study of 100 retarded readers, Eames (95) found that 15 per cent were prematures, either because they weighed less than five and a half pounds at birth, which is commonly taken as one criterion of prematurity, or because they were born before the normal term of pregnancy was completed. This percentage of premature children is higher than occurs among unselected cases. Eames (96) has verified these results in a later study involving a larger sample of poor readers. The relation of prematurity to progress in reading is not clear. Eames did report that neurological lesions, defective vision, slow speed of visual recognition, and certain anomalies of eyedness and handedness occurred more frequently among his premature than full-term cases, and it is possible that the reading problems which develop among the former group are due, at least in part, to these secondary conditions. This interpretation is suggested by another study of Eames (97) in which he found that the incidence of general diseases and defects was considerably greater among reading failures than among nonfailures. It may be argued whether prematurity in a *healthy* infant will seriously affect the rate of learning to read when the child is old enough to go to school, although it is not unlikely that a developmental lag will occur during the very early years, inasmuch as a child born before the full term of pregnancy is completed is actually a younger organism than one born at full term. For that reason, prematurely born children are likely to learn to walk two or three months later after birth than children born at full term in the same families (159).

It should be noted in passing that cases like Child B on Figure 6 occur often enough to give hope to parents that children who are delayed to begin with will learn to read in the end. According to Olson and Hughes (250), girls who are delayed tend to enter their spurt between ages nine and ten, boys between ages ten and eleven. Studies which have followed up the same group of children report low correlations between initial and

final reading status. Organismic age is not an infallible guide to future achievement. One of the girls in Olson and Hughes's study, who was ranked eighteenth in organismic age among a group of 28 girls at age nine, was the best reader of the lot at age eleven.
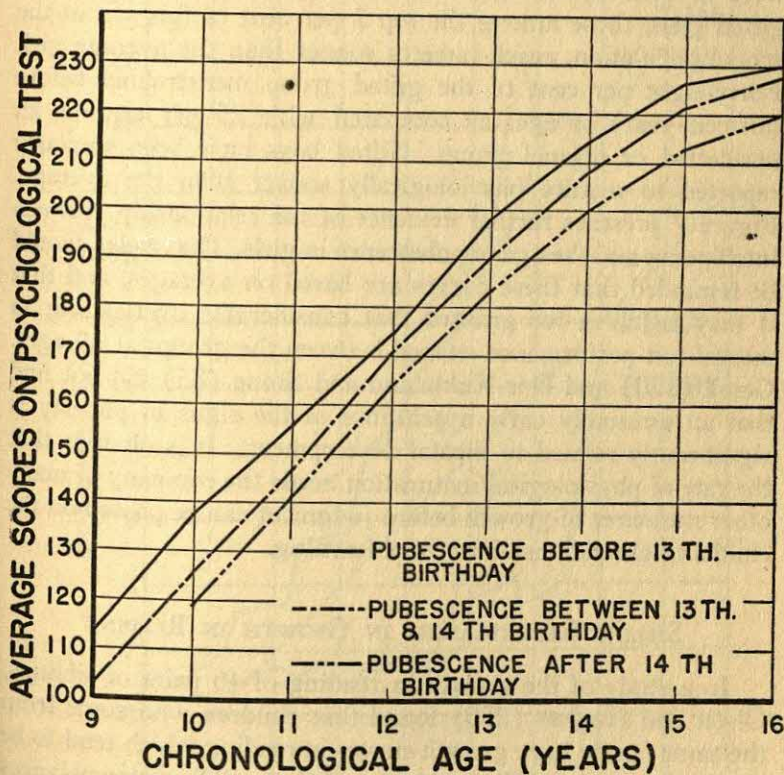
Fig. 7.—Mental-test performance as related to age of pubescence in girls. From Abernethy (1, p. 48), by permission of the author and Child Development Publications.

Previous Studies of the Relationship Between Mental Development and Pubescence

The older literature shows the same positive but low relationship between the age of pubescence and mental development as exists between the physical measurements and intelligence.

Thus both Crampton (60) and Leal (206) found a larger number of children who had reached pubescence among those who were accelerated in school, and a smaller number among those who were retarded, than among children of the same age who were in their normal grade. Terman (315) has shown that gifted girls, those among the top 1 per cent of this sex in the school population, reach puberty sooner than the average girl. Forty-eight per cent of the gifted group menstruated before thirteen years of age, as compared with 25 per cent of an unselected or normal group. Gifted boys have been similarly reported to mature physiologically sooner than the average. Figure 7 presents further evidence of the relationship between intelligence and the age of pubescence in girls. The reader should be reminded that these curves are based on averages, and that it may be taken for granted that considerable overlapping in mental-test performance existed between the groups at all ages. Gesell (130) and Doe-Kuhlmann and Stone (85) did not find that an unusually early appearance of the signs of puberty is significantly related to mental development. It is obvious that the rate of physiological maturation needs the company of many other measures of growth before judgment can be passed on the child's total readiness for school learning.

Sibling Resemblances in Growth in Reading

In a study of the growth in reading of 46 pairs of siblings, Olson and Hughes (250) found that children who come from the same family have growth curves in reading which tend to be similar in pattern. The existence of these sibling resemblances in the pattern of growth in reading constitutes further evidence of the influence of familial and biological factors on the reading process. Figure 8 presents the growth curves in reading for two pairs of illustrative cases. The curves labeled Tom and Tim are for two boys who were born three years apart into the same family. The curves labeled Billy and Bobby are also for two brothers who were born three years apart into another family. The longitudinal method makes it possible to compare the performances of these children as if all were of the same age.

The curves for Tom and Tim are strikingly similar in pattern. Those for Billy and Bobby are also generally alike. A
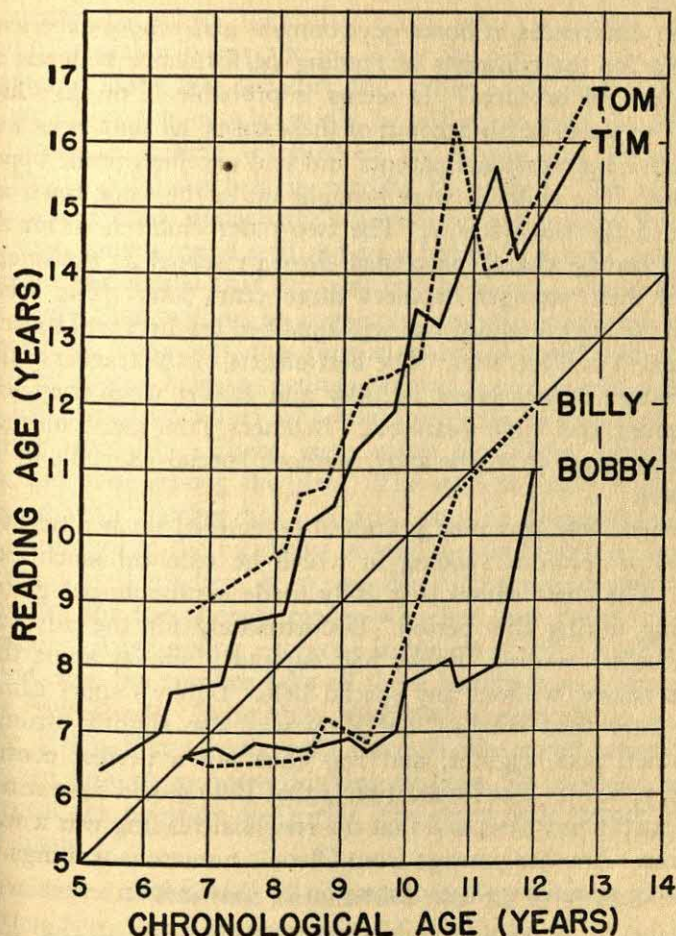
FIG. 8.—Sibling resemblances in growth in reading. From Olson (244, p. 436), by permission of the author and the National Education Association.

difference in the rate and level of progress is apparent: Tom and Tim represent a high level of growth in reading, while Billy and Bobby were delayed in learning to read. The chart thus illustrates both the similarity of the pattern of growth in

reading for children of the same family, and the contrasts in pattern which occur between children who come from different families.

Can differences in home environment and school experience account for the contrasts in reading performance between the two pairs of brothers? It seems improbable. For, as Olson (244) explains in his account of these cases, all four boys were children of professional parents and had excellent home opportunities. The children were brought up in the same town and attended the same school. The two older children (Tim and Bobby on the chart) proceeded through school as classmates, as did their younger brothers three years later. The school which the boys attended had well-qualified teachers and superior equipment and facilities. The best efforts of the teachers failed to produce improvement in Billy and Bobby when they were six, seven, and eight years old. Brothers Tom and Tim made rapid progress from the start, without special exertion by the teachers.

When Billy was nine years old he entered upon a two-year period of remedial reading in which he received much extra help. The chart shows that Billy made a pronounced gain in reading during this period. Unfortunately for the advocates of remedial reading, Bobby had entered a similar spurt three years before, without any special help. Bobby's spurt came a little later than Billy's, "but Billy was also slightly stronger, healthier, and brighter, and was thus not a perfect control" (244, p. 437). The implication is that Billy would have entered his spurt in any case, and that the remedial reading was a waste of time. Another passage from Olson's numerous writings will serve to summarize the discussion to this point:

We now know that the children who start late are growing slowly in many ways, even though of high intelligence, that they probably had mothers who were late in physiological maturing, and that the shape of their curve of growth in reading will be very similar to that of brothers and sisters who have gone before or will come after. Children have designs for growth which are developed by time and experience (245, p. 9).

Sex Differences in Reading Achievement

The writer is reminded of being called by the principal of an elementary school regarding a boy who apparently was in need of special help in reading. What the principal particularly wanted to know was whether the writer could find a student in one of his classes who might be willing to take the boy on as a case. A student volunteered, and a plan was devised for giving the child the help in reading he needed. The student, who was a coed, apparently enjoyed the assignment, because she soon came around and put in a bid for a second case but with the stipulation that the next one be a girl. The principal was more than willing to cooperate, and so proceeded to go through her class lists, this time in search of a girl who might profit by special help in reading. It was a vain search, for not one list turned up a girl who could properly be classified as a reading disability. There were many candidates among the boys, but none among the girls. The student finally had to be satisfied with another boy. A good way to demonstrate this sex difference in the incidence of reading disabilities to groups of experienced teachers is to ask the audience to search their memories for the poorest reader who has ever come to their attention. After giving everyone in the group time to think of a good case, the speaker asks all those having boys in mind to raise their hands. Invariably, almost all the hands go up. A ripple of laughter usually runs through the crowd when it is observed how many were thinking of boys. It is unnecessary to repeat the question for girls. The point will already have been made.

Incidence of Reading Disabilities Among Boys and Girls. —It has been the experience of reading specialists everywhere that more boys than girls suffer reading disabilities. Of Monroe's (231) 415 disabled readers, 356, or approximately 86 per cent, were boys. Of 69 cases of total disability studied by Fernald (105), all but two were boys. Boys outnumbered girls 37 to 4 among the cases reported by Young (366) from the Psycho-

Educational Clinic at Harvard, and 20 to 3 among those reported by Eustis (100) from the Language Clinic of the Massachusetts General Hospital. Durrell (92) has stated that the ratio of boys to girls who have been brought to the Boston University Educational Clinic has been 10 to 1. According to Betts (24), males have constituted more than 90 per cent of the cases studied in the Reading Clinic at Temple University. The ratio of boys to girls who have come to the summer clinic at Michigan has been roughly 6 to 1.

It is possible that there is something about being a future breadwinner that operates selectively to load reading clinics with boys. Gates and Bennett (127), among others, have taken this stand. These workers grant that more boys than girls find their way to reading clinics, but at the same time they feel that the reason may be, not that there are more reading problems among boys, but that these problems are regarded to be more serious for boys than for girls. In support of their position, Gates and Bennett point out that the ratio of boys to girls among reading failures is not as great when the entire school population is canvassed as when only clinic cases are considered. These writers doubtless have a point, but it is not the whole story. Boys still outnumber girls among reading problems, even when school groups are studied *in toto*. In a study of 1,130 children of the Harvard Growth Study who were in their seventh year in school, Durrell (92) found twice as many boys as girls retarded in reading. The children were classified as retarded if their reading age was a year or more below their mental age, and the number of each sex who were retarded was 20 per cent for the boys and 10 per cent for the girls. Alden, Sullivan, and Durrell (3) have made a similar study of another group of 6,000 children from grades two through six. In this study, 18.6 per cent of the boys were classified as retarded in reading, as compared with 9.8 per cent of the girls. In a study of the 100 poorest readers in a large population of elementary school pupils, Witty and Kopel (360) found that 66 were boys and 34 were girls. In a study of another group of 100 retarded readers from grades two to ten of the San Francisco and Oakland schools, Preston (265) reported that 72 were boys and 28 were

girls. A control group of 67 good readers involved in the study consisted of 48 per cent boys and 52 per cent girls. Samuels (290) administered a series of reading tests to pupils in the first five grades and found statistically reliable differences in favor of the girls. Stroud and Lindquist (309) obtained similar differences in reading achievement favoring the girls, on the Iowa Every Pupil Tests of Basic Skills for Grades III–VIII and on the Iowa Every Pupil Tests of High School Achievement for Grades IX–XII. The girls excelled the boys in all the grades tested, but the differences were not statistically significant at the high-school level. Traxler (339) found no clear differences between the sexes in rate of reading, but his subjects were also high-school students. In the light of the total evidence, it seems extremely unlikely that the preponderance of boys over girls among clinic cases is entirely a matter of selection.

Why boys should outnumber girls among reading disabilities has been a topic of considerable speculation. Monroe, for example, has stated : "It is probable that some of the constitutional factors which impede reading are found more frequently in boys than in girls. Reading defects may be similar to color blindness and to a number of other biological variations, in that they occur more frequently among males than among females" (231, p. 99). Eustis believes that the greater frequency of reading problems among boys than girls is due to "an inherited sex-associated weakness of the language function combined with a tendency to ambidexterity" (100, p. 243). A similar idea has been expressed by Gallagher, who states that the "evidence suggests that there is a hereditary factor which is apparently sex-linked and more frequently produces the tendency to a specific language disability in males than in females" (113, p. 37).

As a matter of historical interest, an early "explanation" of extreme difficulties in learning to read was that these difficulties were constitutional, congenital, or hereditary in nature. This notion, which may possibly account for less than one-tenth of 1 per cent of the cases, has persisted into recent times. The present writers doubt that they have ever seen such a case. By and large, children who have difficulty in learning to read are not sport cases. They fall in the lower end of a distribution of

continuous gradation. Reading problems of all degrees occur more frequently among boys than girls. Boys lag behind girls in language functions other than reading. A noticeable difference in the quantity of speech appears between the sexes during the early years. McCarthy (216) has made a study of this problem, and Table II has been constructed from her results. The figures shown in the table are averages and are based on fifty consecutive samples of speech collected under standard conditions. The table shows that the girls excelled the boys

TABLE II

DIFFERENCES IN QUANTITY OF SPEECH BETWEEN BOYS AND GIRLS
AT VARIOUS CHRONOLOGICAL AGES

C.A. (months)	Mean Number of Words		Mean Number of Different Words	
	Boys	Girls	Boys	Girls
18	8.7	28.9	5.4	13.6
24	36.8	87.1	16.6	37.3
30	149.8	139.6	52.8	49.8
36	164.4	176.2	60.1	66.0
42	200.8	208.0	76.7	90.6
48	213.4	218.5	91.1	93.8
54	225.4	236.5	95.8	104.0

From McCarthy (216, p. 113), by permission of the University of Minnesota Press.

both in the total number and in the number of different words used. The differences are marked at first but become less so at the upper ages. Reading follows speech in the language sequence, and Donnelly (89), Steinbach (305), and Samuels (290) have shown that girls tend to get off to the better start in reading. During the beginning stages of reading, errors of reversal are more common among boys than girls. This fact has been demonstrated by Davidson (67) and by Wilson, Burke, and Flemming (358), although it is of interest to add Hildreth's (160) finding, that errors of reversal on the part of both boys and girls definitely decrease as the children grow older and rarely present a problem among mature individuals.

With regard to the other language functions, Lincoln (208) has found that girls also tend to be better writers and spellers than boys. More than twice as many boys as girls stutter.

Sex Differences in Reading Achievement as Related to Sex Differences in Rate of Growth.—A number of factors probably operate to cause more boys than girls to have difficulty in reading. The difference in cultural pattern which exists between the sexes has been prominently mentioned as a factor. An explanation which is receiving increasing attention, however, is that girls generally mature more rapidly than boys. A corollary to this idea is that more girls than boys will have reached a state of readiness for reading at beginning school age. A lack of readiness is a common cause of failure to learn to read in the primary grades, and Carroll (52) has found that girls excel boys on reading readiness tests as well as on tests of reading achievement. The fact that boys tend to be slower than girls in all the language functions suggests that some general factor like growth is at work favoring the girls, and that it is not a matter of specific language entities. The further fact that the differences appear early and then tend to disappear as the children grow older lends additional support to the growth interpretation. The idea is worth pursuing as another demonstration of the way in which reading is related to total growth.

Sex Differences in Rate of Sex Maturation. Perhaps the most apparent difference in rate of growth between boys and girls is the difference in their rate of sex maturation. As Figure 9 illustrates, girls tend to reach puberty sooner than boys. According to the figure, 90 per cent of the girls are physically mature by the age of fifteen and a half years. The same cannot be said for the boys until an age of seventeen and a half years. Individual differences appear within each group. Some girls mature earlier than others, some boys earlier than others. The pictures show some overlapping between the sexes. There are boys who mature earlier than many girls. In general, however, the reverse remains the rule.

Sex Differences in Carpal Growth. Carpal age is a measure of the stage of ossification of the wrist bones, and it may be

WHEN BOYS AND GIRLS MATURE

Each boy represents 10 per cent of all boys of given age measured
Each girl represents 10 per cent of all girls of given age measured
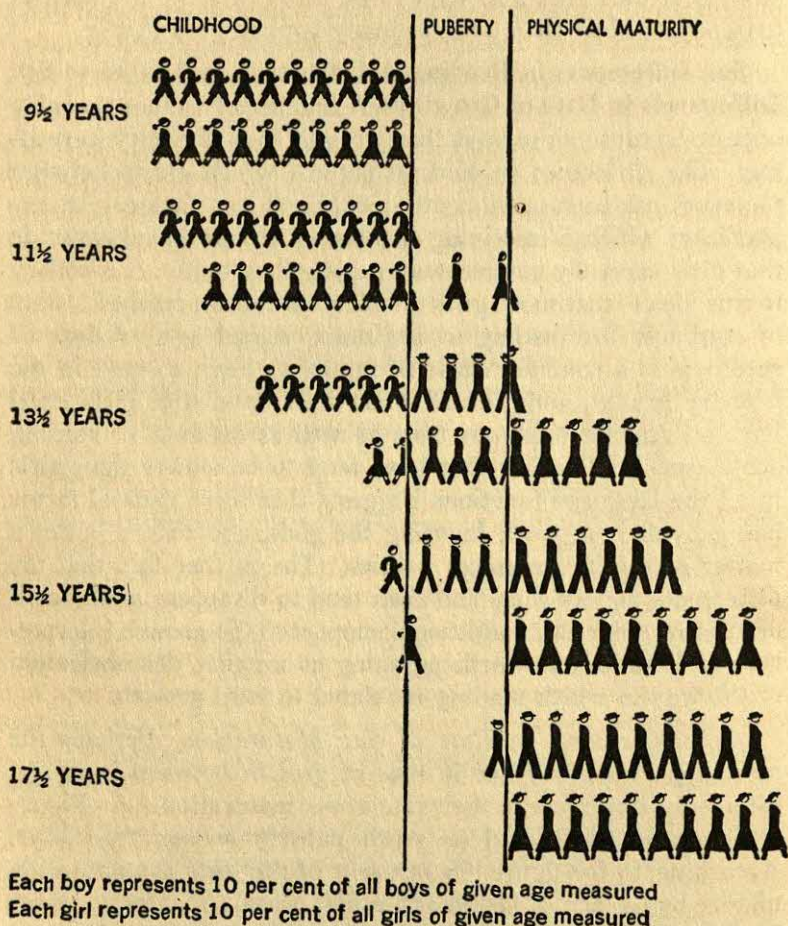
FIG. 9.—Sex differences in rate of sex maturation. From Keliher (195, p. 159), by arrangement with Pictorial Statistics, Inc., New York.

taken as an indication of skeletal development. Carpal age can be determined by comparing an X-ray of the hand and wrist with the typical samples which Flory (108) has identified for each age and sex. A child is assigned a carpal age according to the standard for his sex which an X-ray of his own hand and

wrist matches. The matching criteria are the number, size, and configuration of the wrist bones. The standards are separated by sex because boys and girls of the same age present widely different pictures of carpal growth. The difference favors the girls at each age. Of this sex difference, Flory has written:

Inspection [of the roentgenograms] reveals that the five-year-old girl is fully as far along in her development as the six-year-old boy. It is significant, indeed, that there is a difference of one full year between the sexes in skeletal development at the average age for school entrance. By age twelve, girls are as fully developed skeletally as fourteen-year-old boys. This two-year difference is maintained at ages thirteen, fourteen, and fifteen. Fifty per cent of the girls have reached skeletal maturity at age seventeen when epiphyseal closure in the hand is used as the criterion of skeletal maturity. Fifty per cent of the boys reach maturity, when judged by the same standard, at eighteen and a half, or one and a half years later than girls. . . .

Growth curves for the total area of all carpal bones suggest that girls are near their maximum at age fifteen, while boys approach their maximum carpal development to about the same degree at age seventeen. Growth of bones in size indicates approximately one and a half years of sex difference at age nine, and two years difference at age sixteen. Girls are significantly ahead of boys in skeletal development when they enter the elementary school, but they are still farther ahead when they enter high school, as long as chronological age is the major concept in school admissions and school progress (107, p. 207, 208-9).

It is well to keep in mind that this statement applies only to the average boy and girl of these ages. Individual differences occur in all measures of physical growth. For any trait, therefore, measurements distributed according to sex are likely to show considerable overlapping at each age level. Not all girls mature more rapidly than all boys.

Sex Differences in Dentition. Table III reveals still another difference in rate of growth between boys and girls. This table compares the average ages at which the sexes come by their permanent teeth. Throughout the table, for any number of teeth, the average age of the girls is lower than that of the boys. The average girl, for example, has sixteen of her permanent teeth at age 118 months, the average boy not until age 125

TABLE III

DENTAL AGE EQUIVALENTS FOR THE ERUPTION OF PERMANENT TEETH

Boys		Girls	
Number of Teeth	Dental Age (months)	Number of Teeth	Dental Age (months)
1	70	1	69
2	73	2	71
3	76	3	73
4	78	4	74
5	81	5	77
6	83	6	80
7	85	7	83
8	88	8	86
9	92	9	89
10	96	10	92
11	101	11	97
12	107	12	103
13	113	13	108
14	118	14	112
15	122	15	116
16	125	16	118
17	127	17	121
18	131	18	123
19	134	19	126
20	136	20	128
21	138	21	130
22	139	22	133
23	141	23	136
24	143	24	138
25	146	25	141
26	150	26	145
27	156	27	152
28	159	28	153

From Cattell (56, p. 55), by permission of the Harvard University Press, Cambridge.

months. Moreover, X-ray photographs of the unerupted teeth show a sex difference in growth in favor of the girls.

Sex Differences in Height, Weight, and Strength of Grip. Age for age during the early years, girls tend to be lighter in weight, shorter in height, and weaker in strength of grip than

boys. Girls, however, tend to reach their maximum growth in these attributes sooner than boys. As shown first by Baldwin (16) and then by Meredith (225) and Boynton (38), girls tend to reach their maximum growth in most of the physical measures by the age of fourteen or fifteen, boys not until several
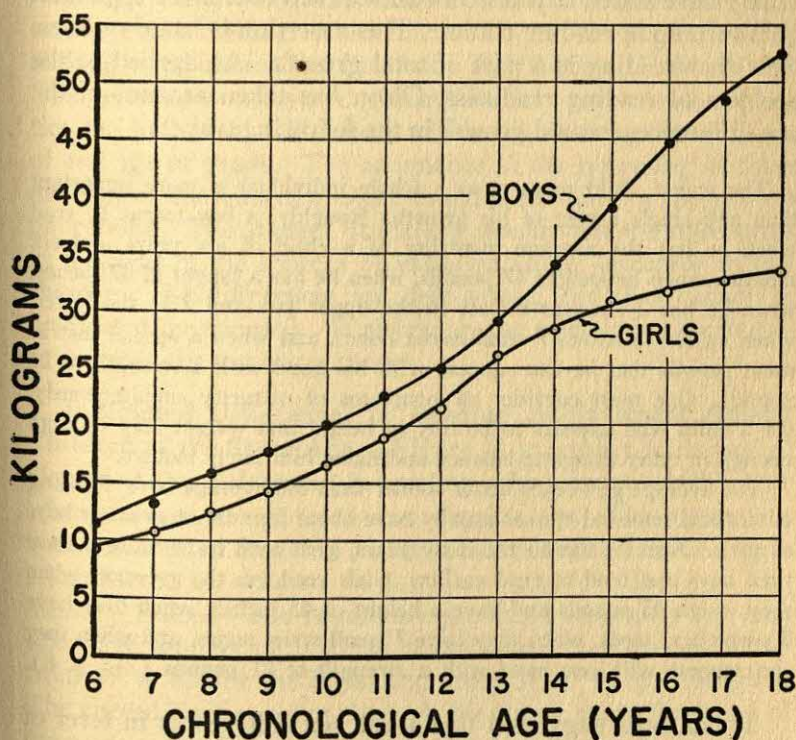
FIG. 10.—Sex differences in growth of strength of grip. From Jones (188, p. 103), by permission of the National Society for the Study of Education.

years later. During the early years, therefore, a given height, weight, or strength of grip yields a higher growth age for girls than boys. Figure 10 illustrates the sex differences for strength of grip. It should be explained that strength of grip is used in growth studies to assess or sample the strength of the child's muscles, and is measured by having him squeeze a small instrument known as a dynamometer.

Recapitulation. To return to the original premise of this discussion : From the standpoint of total growth, girls are likely to be more ready for reading than boys at beginning school age. It follows, therefore, that more boys will falter than girls, if equal pressure is brought to bear on both to read. Olson and Hughes (250) have stated that it is not an accident that more boys than girls turn up in reading clinics. This assertion is based on their view that reading is a part of total growth. As applied to the problem of reading readiness, Olson has taken account of the sex differences in total growth in the following way :

The way a child matures as a whole individual is more important than any single aspect of his growth. Roughly, a boy learns to read when he has the average mentality of a child of six years and six months, when he weighs 47 pounds, when he has a height of 47 inches, when he has 2 six-year molars in the upper jaw and 2 in the lower, when an X-ray shows 7 small wrist bones, and when a special instrument reveals that he can squeeze with his hand with a strength of 26 pounds. One must consider all symptoms of maturity simultaneously, for a child who appears to be tiny in height and weight may be high enough in other things to balance and make him fairly mature.

The average girl reads better sooner than the average boy. Reading clinics and remedial classes usually have about four times as many boys as girls. Age for age in the early years, girls tend to be more mature than boys and tend to read earlier. Girls read, on the average, when they weigh 45 pounds and have a height of 45 inches, when they have 5 permanent teeth, when they have 7 small wrist bones, and when they can squeeze with one hand with a strength of 21 pounds (245, p. 8).

It has been suggested that these sex differences in level of growth might be neutralized by starting boys in school at a later age than girls. This proposal, while made with good intentions, overlooks the individual differences in growth which occur within each sex. As will be shown in the next section, these individual variations carry over to reading. It is easy to overemphasize the sex difference. It exists, on the average, but the individual differences within each group are vastly greater. There are both boys and girls who might profit by a delayed start, just as there are individuals of each sex who are more than ready for school at the usual age. What is needed is a

school practice which will allow all children to proceed at their individual patterns and rates of growth.

Individual Differences in Reading Achievement [4]

Every teacher should have the experience of administering a standardized reading achievement test to her pupils, and of making a tabulation or frequency distribution of the results. This exercise would serve to bring forcibly to the teacher's notice the individual differences which exist among the children of any age or grade. The acceptance of the normality of these differences constitutes another foundation stone of the growth philosophy. The student of growth would view the differences in the light of the sources of variation so far discussed in this chapter. The differences are deep-seated, and they cannot be eradicated by training. If anything, the effect of schooling is to increase the variation shown.

Individual Differences in Reading Achievement Among Children of the Same Age.—Figure 11 presents a fairly typical picture of the differences in reading achievement which occur when children are grouped according to age. This figure has been constructed from the results of standardized reading tests administered to children in the University of Michigan Elementary School. The results are presented separately for each sex. The number of children in the several age groups varies from 47 to 87 for the boys, and from 38 to 81 for the girls. The curved lines running through the figure show the trend of the average results, while the horizontal lines indicate the ranges of achievement.

While the average results increase from age to age, the most notable thing about Figure 11 is the ranges of achievement shown. The variation increases as the age groups become older. At a life age of 132 months, a total difference of more than ten years occurs among the boys. That such differences could exist seems amazing, but the literature abounds with

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[4] This section is adapted by permission of the publisher from an earlier article by one of the present authors (8).
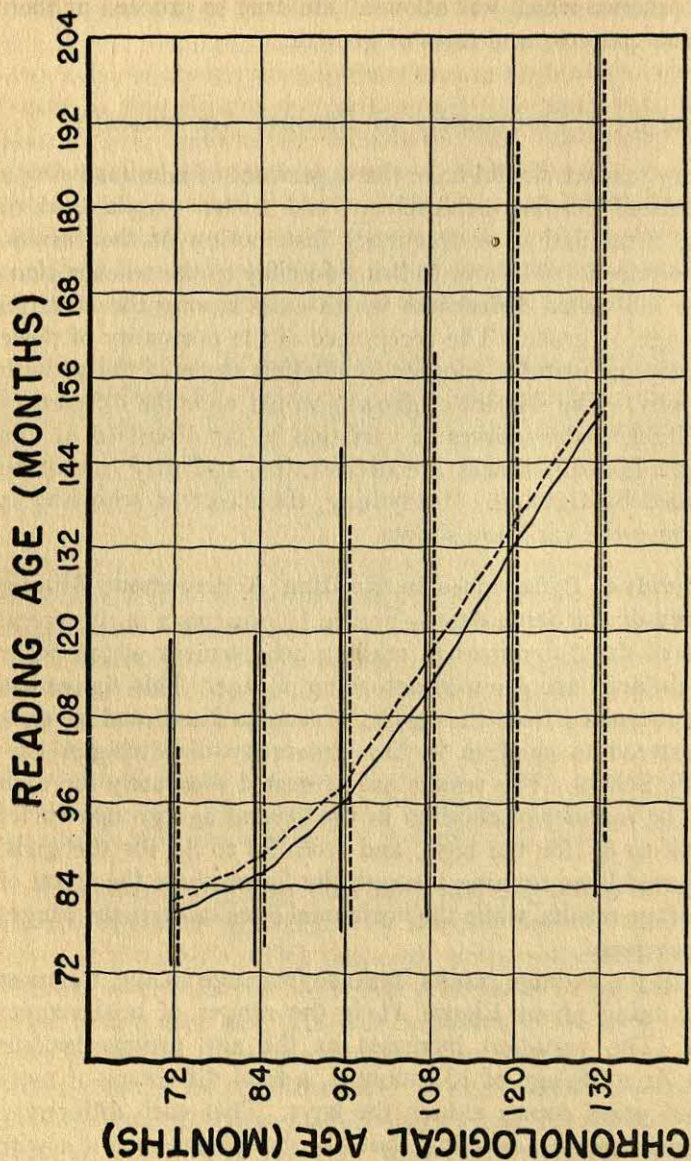
FIG. 11.—Differences in reading age among children of successive chronological age groups (solid lines, boys; broken lines, girls).

supporting evidence. Variation is the rule in all the school subjects.

In view of the variations in reading achievement which show up within age groups, it is inevitable that considerable overlapping in performance will occur between groups. Figure 11 shows how it works with reference to range of performance. The two youngest age groups are virtually indistinguishable in terms of this measure. .The same may be said for the two oldest age groups. Some overlapping exists throughout all the age groups represented on the figure. There was a boy at age 72 months who had as high a test score as the average child at age 132 months. Another boy at age 96 months achieved a test score which was almost on a par with the performance of the average child at 132 months. It can even be said that there were children among the six-year-old group who read better, according to the tests, than some of the eleven-year-old children.

Incidentally, Figure 11 can be reviewed with profit with reference to some of the things which were said earlier regarding sex differences in reading achievement. The figure shows that the girls, on the average, were slightly but consistently superior to the boys, but that the boys were just as consistently more variable. The greater spread among the boys tends to throw more cases of this sex to both extremes, which is in line with the classic doctrine that the greater variability of the male covers both ends of the distribution. The figure clearly shows how much larger in scope the individual differences are than the sex difference. The individual variation leaves small choice between the sexes, except as the boys vary slightly the more. Millard (229) has published a study which brings out many of these same facts. His study was concerned with the relationship between the preadolescent growth cycle in reading and intelligence and sex. He found that the more intelligent pupils of both sexes entered their cycle of development sooner than the less intelligent, but he also discovered that girls tended to enter their cycle earlier than boys. However, wide individual differences in reading achievement were apparent among both boys and girls at all the ages studied. Similar results have been obtained for Negro children by Goodlett and Calloway (134).

Individual Differences in Reading Achievement Among Children of the Same Grade.—Since children nowadays tend to be passed along in school in chronological age groups, the differences in reading achievement which are typical of the children of any age are likely to occur when pupils are grouped according to grade. Figure 12 presents a good illustration of this point. This figure has been constructed from the results of a standardized reading test given to all the sixth-grade pupils
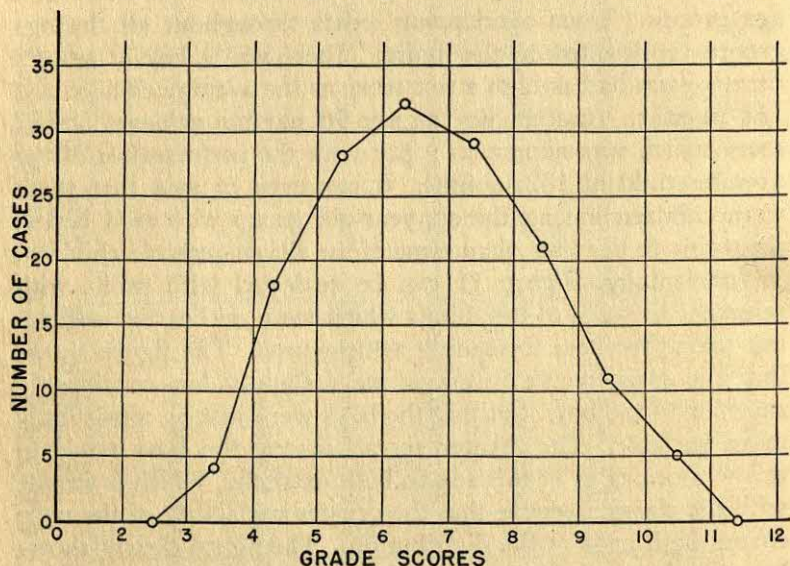
Fig. 12.—Individual differences in reading grade among a group of sixth-grade children.

of the elementary schools of a suburban community near Detroit. The results were converted into grade scores, and the graph shows how these scores were distributed. The distribution is remarkably normal or bell-shaped in appearance. The main talking point again, however, is the variation of the results. The range extends from a grade score of 3.5 to one of 10.5, which is a total difference of seven grades. On the basis of similar studies, Betts (23) has reported that fifth-grade pupils may vary in reading achievement from approximately the preprimer to twelfth-grade level. Harris (151) has re-

ported the results of an extensive survey involving 19,063 eighth-grade pupils from the New York City schools, in which the subjects were found to vary in reading achievement from below the third-grade to the college level. Two surveys conducted by the Bureau of Cooperative Research and Field Service of the School of Education, Indiana University, involving 15,206 sixth-grade pupils in 648 schools in Indiana (301), and 11,424 sophomore students in 243 high schools (302), revealed extraordinary variation among both groups on the basis of scores on the Iowa Silent Reading Tests. If a variation of three years is taken as reasonable within a grade, 38 per cent of the sixth-grade pupils fell outside this range. Gray (142) reported a survey in which 22 per cent of nearly 6,000 ninth-grade students from a Chicago suburb fell below the seventh grade in reading ability, as measured by a standard test. Seventh-grade reading achievement has been suggested by Gray as the minimum requirement for successful high-school work.

The Implications of Individual Differences in Reading Achievement.—To turn now to some of the practical aspects of the matter. The reader-per-grade idea, certainly, is difficult to defend in the light of the variation in reading achievement which is normally present among the children of any age or grade. The use of the same sixth-grade reader, for example, with the group represented on Figure 12, would miss both ends of the distribution. Too many teachers, however, persist in the belief that all children should be brought up to grade each year in reading. In this they are not unlike many parents. It is not unusual to hear a teacher attribute her reading problems to the idea that the children were not brought up to grade the year before. The implication is that the teacher who had the children the year previously was not on the job. It cannot be done. Children do not grow like norms on published tests. In a study of the growth in reading of 28 boys and 28 girls representing a University of Michigan Elementary School population, Olson and Hughes (250) were unable to find a single case whose growth in reading could be described by the line of average development.

The superior pupil is usually able to shift for himself, insofar as reading is concerned. Studies (43) have shown that reading ranks high among the leisure-time activities of bright children, and other work (361) has revealed that the books and magazines which bright children select for their recreational reading possess high literary value. The real losers from the reader-per-grade concept are the children in the low end of the distribution. A case in point was that of a boy of twelve who was placed in the fifth grade but who had not made the expected progress in reading. An examination at the child's school quickly disclosed that the boy had no better than second-grade reading ability. To satisfy his curiosity, the writer asked the lad to go into his room and fetch the book that he held in his hands during the reading period. The youngster quickly returned with the book in hand. It was a fifth-grade reader! The material was obviously too difficult for this pupil. Pressure was nevertheless brought to bear on him to read the material during the reading period. The boy had developed the habit of nervously scratching the side of his head each time he stumbled over a word or caught himself making a mistake. This habit was plainly a reaction to the frustration that he encountered in trying to read material which was too difficult. He had developed other problems as well, including a defeatist complex toward reading. For this child, reading was without any purpose or enjoyment. The distressing part of it is that his case can be endlessly multiplied in schools which follow the practice of assigning a reader per grade, come what may. The children learn to dread reading and to abhor school.

A teacher cannot be a teacher of any one grade alone, but rather must teach all the grades represented in her class. Just because a child sits in a room designated as such and such a grade is no sign that he needs material commonly assigned to that particular grade. Material must be found for every level of attainment, and the interests of all must be satisfied. Meaning or context constitutes the prime requirement for learning to read. This condition cannot be met if half the words are unknown to the child. Bond and Wagner have sized up the evidence correctly in the following passage:

Another interesting conclusion that may be drawn from the study of any table indicating range of reading ability in any one class . . . is that the teacher is not a teacher of a given grade, but a teacher of many grades. She is not only a teacher of fourth-grade reading, but a teacher of reading of all the grades from the third through the eighth. She is not a teacher of sixth-grade reading, but a teacher of reading of all the grades from the third through the eleventh. It is, therefore, futile to talk about levels of attainment that should be reached by all the children within any given grade. It is far better to know that the children grow at varying rates and that adjustment must be made by the teacher and the school to these individual differences (31, p. 53).

The idea that a teacher can be a teacher of one grade alone is an abstraction of the mind. A teacher of a combined third and fourth grade had the right idea when she responded to a query regarding her dilemma: "It makes no difference at all. If you didn't know the children, you couldn't tell who were in the third grade and who in the fourth." This teacher was taking it all in her stride. She knew that the individual differences which normally occur in each grade would make her two groups practically indistinguishable. Yet teachers have been known to view with alarm the juggling of staff that circumstances occasionally force upon schools. A teacher, for example, who has never taught anything but fourth grade wonders how she will ever be able to manage the third grade which has been thrust upon her in the shuffle. As one teacher protested, "I have always taught fourth grade—I don't know anything about third grade." That such notions could exist is a commentary on the rigidity with which some schools operate their programs. In some schools teachers are virtually forbidden to use any but the reader which is standard for their grade, despite the fact that some of the children might be able to read the whole book at one sitting, not to speak of the rest of the series, while other children might take two or three years and not make any real headway with the material. All the children must somehow be made to utter the words on the last page of the reader before the end of the year, but to allow any of them to go on to the next reader might spoil it for the teacher in the grade to follow. The rest of the curriculum may be just as rigidly prescribed. Some

teachers will not stand for it and soon begin looking for another job.

Much abuse has been heaped on modern methods of teaching reading mainly by parents who are disappointed because their children do not compare favorably in reading achievement with their classmates in school. Similar attacks are made in newspapers and in popular magazines and occasionally even in professional education journals. The plea seems to be for a return to the old alphabet and phonetic methods of teaching reading. Most of this agitation can be put down as a failure to recognize that there is always going to be a low end to the distribution, regardless of the method used. When pupils fail, parents naturally begin looking for excuses. The teacher and her methods constitute an obvious target.

SUMMARY

To attempt an answer now to the parent's query with which this chapter was launched. Reading is still very much taught in the schools. More time is devoted to reading in the primary grades than to any other school subject. Methods have changed, but most authorities in this field agree that the changes have been for the better. No method can get around individual differences. Parents do not expect children to be of the same height or weight. It is equally foolhardy to expect that children will learn to read alike. As Quintilian, who was born A.D. 35, said, "there is in talent an incredible variety, and the forms of mind are not less varied than those of bodies." [5] Children may be delayed in learning to read, even though they have good minds. Reading is an aspect of total growth, and the reason that some intelligent youngsters get off to a slow start is that they are immature in other ways. The same children may eventually develop into excellent readers if parents are willing to bide their time and accept the child as he is. The school has an equal responsibility in this regard. The low end of the distribution presents no special problem to schools which are con-

[5] Quoted in William Boyd, *The History of Western Education* (London: A. & C. Black, Ltd., 1921), p. 76.

ducted according to the growth philosophy. Each child is taken wherever he is and given an opportunity to function at that level. Individual differences are taken for granted. Retarded readers are free to select easy books, the advanced may select whatever appeals to them. Olson and Davis (247) have found that under this permissive system, children consume books according to their individual timetables of growth. The practice is a comfortable one for the children as well as for the teachers. The object of the growth philosophy is to promote growth by providing the opportunity. It leaves it to the children to seek experiences which are compatible with their total growth designs. Regarding this seeking behavior, more will be said in the next chapter.

Chapter 2

THE CONCEPT OF READING READINESS

Introduction

"What is this 'reading readiness' they talk about at school?" asked a young mother of her companions one afternoon at bridge. No one was able to give her a satisfactory answer. Reading readiness *is* hard to define. There is nothing particularly new about the term. It appears to have been introduced in the 1925 *Report of the National Committee on Reading* (141). The term has been used freely ever since. Too often, however, there is an element of circular reasoning in the way it is used. If the children learn to read, they were ready; if they do not learn, they were not ready. The concept or name is offered as the *explanation* for success or failure. It is an example of what Holt (173) has called "verbal magic" or the "reifying power of words."

It may be possible to arrive at a better notion of the term by noting a few of the characteristics of children who are described as lacking reading readiness. Not uncommonly they are small and frail. They are often immature socially and emotionally. They may be delayed in language development. They frequently make low scores on mental tests. They often exhibit poor motor control.

Just the reverse characteristics are likely to distinguish the child who gets along well in reading and who learns to read when it is expected that he should. More times than not, these children are large and robust for their age. They tend to be well adjusted socially and emotionally. They have good speaking vocabularies and much information at their command.

They make high scores on mental tests. As a rule, they have excellent motor control.

By studying these and other differences between children who learn to read when they first enter school and children of the same age who do not, it becomes clear that no narrow definition of reading readiness is possible. There are exceptions to any distinguishing characteristic which may be singled out. What can be said is that children who are delayed in learning to read are typically immature in one or more ways. All will agree that there is a time in the development of each individual child before which it is futile to teach him to read. Reading readiness implies a certain stage of maturity, broadly conceived. This concept of reading readiness applies not only to first reading but to reading at all levels, inasmuch as the idea that reading is a function of total growth holds throughout the course of childhood and adolescent development. Where reading readiness ends and real reading begins is a moot point.

In the present chapter, however, we shall explore the matter as it applies to the vicissitudes of beginning reading. The problem is one, a discussion of which logically follows the beginning made in the last chapter.

Individual Differences in Readiness for Reading

Children entering the first grade differ radically in their readiness for reading and in their capacity to learn. Making appropriate adjustments to these individual differences remains one of the big tasks for the teacher and the school. Before proceeding to a discussion of some of the adjustments which are possible, we should first get before us some tangible evidence of the size of the problem which must be faced.

Individual Differences in Word Recognition.—Mastering the vocabulary of the preprimer, primer, and first reader constitutes one of the first steps in learning to read. Until this vocabulary is acquired, there can be little talk about other measures of reading ability such as rate and comprehension. Most reading difficulties in the primary grades involve a failure to acquire a basic sight vocabulary. Growth in word recognition,

therefore, offers an excellent means of studying individual differences in learning to read. Donnelly (89) has made a study using this approach.

Donnelly first devised a test consisting of 150 words selected at random from the first two levels of the *Gates Vocabulary for Primary Grades*. The words were arranged in order of difficulty and administered in individual tests to 389 children in the first grades of seven different schools in Newton and Belmont, Massachusetts. The ability to pronounce the words correctly was taken as the measure of word recognition. The first 75 words of the list were given to the children at the end of the third month of school, and the first 125 at the end of the sixth month, and the whole list of 150 at the end of the ninth month. Preliminary testing of groups of children not included in the experiment had indicated that this division of words provided an adequate "ceiling" for each test period. The results of Donnelly's study are presented in Table IV.

It is obvious, at a glance, that these children differed widely in their word recognition skill. The differences increased as the children advanced through the grade. The results for the test in May run the whole gamut of scores. The number of pupils who made slow progress is impressive. At the sixth month, according to Donnelly's report, more than 40 pupils failed to reach the average score for the third month; and at the ninth month, 90 children fell below the sixth-month average and 20 still remained below the third-month norm. Similar results have been obtained by Boney and Lynch (35), in a study in which monthly tests to measure growth in word recognition were given to a group of first-grade pupils in the Nassau School, East Orange, New Jersey. The records collected reveal that one child who achieved second-grade status at the end of the fourth month made scores of 12, 34, 76, and 186 on the tests. During the same interval, another child made scores of only 0, 0, 6, 7, and 8. Of 108 complete cases, 36 made a growth of only three months during the year.

Studies of Failures in the First Grade.—Schools which adhere to a policy of promotion and nonpromotion are likely to be

TABLE IV

INDIVIDUAL DIFFERENCES IN GROWTH IN WORD RECOGNITION
IN THE FIRST GRADE

Score	Number of Children Making Score		
	November	February	May
150–154	–	–	3
145–149	–	–	14
140–144	–	–	6
135–139	–	–	9
130–134	–	–	9
125–129	–	–	18
120–124	–	4	9
115–119	–	4	14
110–114	–	4	16
105–109	–	5	19
100–104	–	5	20
95–99	–	10	17
90–94	–	10	19
85–89	–	12	15
80–84	–	17	16
75–79	2	24	17
70–74	0	11	17
65–69	0	27	15
60–64	4	19	18
55–59	4	20	14
50–54	4	31	9
45–49	8	26	10
40–44	17	20	12
35–39	26	29	10
30–34	40	14	10
25–29	46	18	4
20–24	55	18	6
15–19	73	7	8
10–14	48	11	3
5–9	36	16	6
0–4	25	7	2

From Donnelly (89, p. 41), by permission of the Palmer Co.

harsh on children who are slow in learning to read. Surveys
have shown that in the past, the rate of nonpromotion for all
grades has approached 10 per cent. Studies have uniformly
shown that the failure rate is highest in the first grade. Thus
Heck (154), in a study of the school reports of twenty-five

representative cities, found a median rate of failure of 9.1 per cent for all twenty-five cities and all grades, but a median rate of 16.5 per cent for Grade I alone. On the basis of a similar survey, Caswell (240) reported an average rate of failure of 16 per cent in the first grade, with an average rate between 8 and 10 per cent for the remaining grades. Yageman (365) has cited the results of a survey conducted by the Research Committee of the California Kindergarten-Primary Association which disclosed a failure rate of 19 per cent in the first grade. Of the causes of nonpromotion in the primary grades, failure to learn to read heads the list. According to Yageman's review of the California survey, 29 per cent of the failures reported in the

TABLE V

BASES FOR PROMOTION FROM FIRST GRADE TO SECOND GRADE, AS REPORTED BY 536 SUPERINTENDENTS OF SCHOOLS

Basis for Promotion	Frequency of Mention
Reading ability	277
Teacher's judgment (largely of ability to do second-grade work)	214
Educational achievement	165
Arithmetical ability	74
Standard tests	70
Chronological age	69
Ability to do second-grade work	57
Mental age	49
Social development and maturity	41
Writing ability	37
Length of time in grade	31
Language ability	29
Greatest good to the individual determined on the basis of case history	29
Size and physical development	26
Ten other bases, each mentioned less than twenty-five times	–

From Otto (252, p. 29), by permission of the University of Chicago Press.

first grade were due to failure or inability to meet the reading requirements of the grade. Otto (252) has reported the data shown in Table V. These data consist of a summary of the findings of a study published by the National Education Association in 1931 (106), in which a large group of superintend-

ents of schools were polled regarding the criteria they used in promoting pupils from the first to the second grade. As the table shows, reading ability was mentioned most frequently by the 536 superintendents who responded to the ballot. Many of the other criteria mentioned involve reading, at least indirectly. One may infer from Table V that failure to learn to read looms large as a factor in nonpromotion early in the grades. Gates (125) has noted the results of Percival's study of 1926 (256), in which failures in reading were found to account for 99.15 per cent of all cases of nonpromotion in the first grade, approximately 90 per cent of all those failing of promotion in the second grade, and approximately 70 per cent of the total failures in the third grade.

EDUCATIONAL METHODS AND READING READINESS

The evidence reviewed above may be interpreted to mean that many first-grade entrants are not ready to read by conventional standards. The California survey reviewed by Yageman estimated the number of such cases at 28 per cent. Inability to understand and use English effectively, mental immaturity, or both, were given as the reasons for the lack of readiness. On the basis of scores on the Kuhlmann-Anderson Intelligence Test and the Metropolitan Reading Readiness Test, Fallon (102) estimated that 16.3 per cent of the children entering the first grade of the Chicago schools were not ready for reading. The percentage varied from 8.7 to 24.9 per cent for different parts of the city. Kottmeyer (199) made a similar study of the reading readiness problem among low first-grade pupils in the St. Louis schools. Using the Metropolitan Reading Readiness Test as his criterion, he reported that 29 per cent of the white pupils and 64 per cent of the Negro children had less than an even chance of making a year of progress in reading in the first grade. While nonpromotion as a solution for failure to learn to read is no longer as common as it once was, the problem of the immature or slow-learning child still exists and the question arises as to what other measures can be taken to suit the school to the individual. Olson and Hughes (250) have described

three possible courses of action which they call "forcing," "pacing," and "delaying." The rest of this section will be devoted to an appraisal of the strategy of these methods.

"Forcing" as an Educational Method.—This may be described as the conventional or "Here I come, ready or not" approach, in which it is taken more or less for granted that all children should learn to read in the first grade. The idea behind this method is that most children can learn to read if the right approach is used and if the teacher is clever enough. As a part of her cleverness, the teacher is expected to be skillful in constructing games and devices and other aids to learning. She may also be expected to resort to much coaxing and cajolery and many external incentives. Parents are inclined to think in terms of this method. Learning to read is identified with the first grade by most parents. If their own children do not learn to read at that time, they tend to blame the school. Common complaints are: not enough phonics is taught; the children are not made to learn their letters any more; it's that "look-and-say" method; the children are given too much freedom; they are not made to buckle down to their work; there is insufficient drill on the fundamentals nowadays; the whole modern school setup is lackadaisical. As one irate father put it, "They tell me at school that my son has a normal I.Q. Well, why hasn't he learned to read?" This person, who was a distinguished surgeon, went on to declare that if he were as dilatory in his practice as modern schools are in theirs, he would not survive an instant in his profession. The writer has encountered parents who, in their disappointment over the failure of their children to learn to read, have yanked their charges from one school and transferred them to another in an effort to improve their luck. Frequently they hire tutors on the side or turn to reading clinics; anything to get their children to learn to read when other youngsters do.

Apropos of the traditional approach, Mary I. Preston, a medical doctor herself, has made a plea "for special training for teachers of *beginning* reading so that they may become masters of the art of teaching the subject, no matter what individual

differences in the learning process are encountered" (266, p. 458). Dr. Preston made this recommendation on the basis of her experience with forty nonreaders, 78 per cent of whom became good readers and 13 per cent fair readers when taught by masterful beginning methods. On the basis of similar evidence, Dunklin (90) is almost as insistent that reading failures in the first grade can be largely eliminated through the use of appropriate teaching methods.

The Role of Repetition. These so-called "forcing" methods received much of their original support from laboratory studies on the psychology of learning. One thing that these studies certainly have shown is that individuals differ in the amount of practice or repetition they need to learn a task or to form a response. Working with a group of more than fifty normal children, varying in age from about twelve to eighty-nine months, and with a small group of feeble-minded children, Mateer (213), for example, found that the feeble-minded subjects averaged about twice as many trials as the normal group in order to form a conditioned salivary-response. Such findings carry the definite implication that slow-growing and backward children will learn if only they are given enough repetition or drill. Gates (117) once made some estimates of the number of repetitions per word that primary-grade children of different degrees of relative brightness might appropriately require in order to take hold of the vocabulary of beginning materials. These estimates are shown in Table VI.

One of the requirements of basal reader materials is that large amounts of repetition of the vocabulary used be provided. Basal reader materials are prepared according to the safe assumption that a certain amount of repetition is needed by all children, and the makers of such readers are strongly influenced by the idea that the slow will learn if only they are given enough repetition.

There are many common examples as well as experimental findings, however, which *seem* to show that mere repetition of an experience may not further the learning of it or at least of some aspects of it. It is a common parlor game to inquire

whether the numbers on one's watch are in Arabic or in Roman, whether 6 or VI is used. Many persons will not be aware of the fact that there may be no number six on their watches, the dial of the second hand taking its place. Some people who

TABLE VI

ESTIMATED NUMBER OF REPETITIONS PER WORD NEEDED BY CHILDREN OF VARYING BRIGHTNESS AT THE AGE OF BEGINNING READING

Range of I.Q. (Chronological Ages Between 6.1 and 7.5 Years at Beginning of Term)	Number of Repetitions to Be Provided in Reading Course, i.e., Aside from All Incidental Reading
120–129	20
110–119	30
90–109	35
80–89	40
70–79	45
60-69	55

From Gates (117, p. 35), by permission of the author.

have repeated the Twenty-third Psalm hundreds of times in unison are not able to say it themselves, partly because they have never had the *intention* of learning it and partly because, through habit, they have come to depend, at critical places, on the cues which the voices of others in the audience supply. A story is told of Professor E. C. Sanford, once an expert student of the psychology of memory at Clark University. Professor Sanford had for years been in the habit of *reading* a short Episcopalian prayer each morning at the breakfast table. When asked one day by someone in the psychological laboratories at Clark to recite the prayer from memory, he found that he could not do so. Students may be observed looking up over and over again the meaning of the same word in making a French translation, often not being able to remember the meaning of the word long enough to turn back from the vocabulary to the text. So it is now being realized that the meager vocabulary of their native tongue of many college students is not due so much to lack of opportunity as to the fact that they have not paid attention to words; they have not been, in current lingo, "word-conscious."

Similarly, the children are few who remain poor readers because they have not had enough practice, and it has not been convincingly demonstrated that forcing them to practice helps to remove the difficulty. Here we are told about the child who was kept after school because he had been caught saying, "I have *went* home," when he should have said, "I have *gone* home." His punishment consisted of having to write the correct expression one hundred times on the blackboard. The child finally finished, after what seemed like a century, only to discover that the teacher had meanwhile stepped out of the classroom. Whether to wait for the teacher or not was the question. As a means of resolving his dilemma, the child decided to write the teacher a note and as a parting shot wrote on the blackboard "I have went home." The child then "legged" it home. This incident has been employed as a stock illustration of the fact that without a motive to learn or an intention to remember, the mere practice of a response is not likely to stamp it in. The role of intention in learning can be neatly demonstrated by dividing a college class into twosomes, one student reading a list of nonsense syllables to the other, with the other charged to learn the list in as few trials as possible. The experiment takes a sudden twist when *both* parties are afterward asked to reproduce the list. Those who played the passive part of reading the list to their partners in the experiment typically throw up their hands and exclaim, "You didn't tell us that *we* had to learn them too!" They had as much practice as their opposite numbers—the difference is one of practicing with and without an intention to learn.

The failure of practice alone to achieve results is familiar to everyone who has worked with reading disabilities. To take a case: here is a boy of sixteen who was placed in the tenth grade when he first came to the attention of the writers several years ago. The records which were sent along in his case stated that he "was unable to recognize any words except 'the' and 'a.'" Later tests revealed that he was not even certain of these words. For all practical purposes, he was a total nonreader and had no word recognition ability at all. The amount of practice and special help which this boy has received has been far out of the ordinary. There are words which he has practiced hundreds of

times at the hands of various tutors. To this day one can never be sure that he will remember the words the next time he sees them. The boy has a good mind. He has been examined by a neurologist, a psychiatrist, and any number of clinical psychologists; no one has found the answer to his problem. It is clear that his difficulty has not been due to any lack of practice or repetition. If there is one thing that can be learned from this case, it is that there are times when no amount of practice will be effective alone as producing learning. The school superintendent, no less, spent one whole summer tutoring the boy without success.

In the light of these and numerous other examples, some of the ways in which *drill* has been employed in the schools in the past need to be reexamined. It is no longer possible to rely on the mere strengthening effects of use, as in strengthening a muscle by exercise, that doing a thing over and over again will wear down a path in the nervous system and thus somehow better the performance. Repetition is important only as it permits certain other conditions to operate. Reference has already been made to this matter of the intention of the learner, whatever that might be in objective terms. There are other conditions, such as the motivation of the learner. Even Pavlov used *hungry* dogs in his experiments. If a child has a strong internal desire to learn to read, he will ordinarily learn in much less time than might otherwise be the case, and any table of the amount of repetition required would need to be revised. Similarly, as some evidence which is to be reviewed shortly will show, mature children learn more rapidly than immature children. Gates' table is really an expression of that fact: his estimates of the number of repetitions which beginning readers of different intelligence quotients need in order to learn a word constitute an effort to compensate for differences in mental maturity. Would different amounts of repetition be needed if the children were taken at the same level of mental maturity? This question suggests what may be regarded as an alternative approach—waiting until a favorable mental level is reached before attempting to teach any child to read. Several experiments along that line will be reviewed later in this chapter.

Age of Learning to Read as Related to the Methods and Materials of Instruction. By way of another expression of the policy that there is no time like the present, it has been suggested that children who are not ready for reading under one program may be entirely ready under another. Learning doubtless does vary as a function of the task. The statement, for example, that a child is not ordinarily ready mentally to enter the first grade of the public schools until he has reached a mental age of six is essentially meaningless. All that it means is that since six is the usual age for admission, the standards or expectations of first-grade accomplishment have been gradually defined to about the level of six-year-old minds. By adapting the materials and methods to the needs of the case, Gates demonstrated that children of mental ages of five can be taught to take their first steps in reading, but, to give Gates his due, he said of his study that "although the data seem to indicate that it is *possible* to organize materials and methods to teach children to read at a mental age of 5.0 or higher, they do not in any way imply that it is *desirable* to do so" (120, p. 508). Neither do the data indicate that the children should not be taught.

In individual cases, usually under parental encouragement or private tutoring, reading at three and four years of age has been reported in the educational literature, in the biographies of some great men (and of some little men), and is currently verified in the routine activities of many a psychoeducational clinic.

Here is Tom, for example, C.A., 4–9, M.A., 8–0, I.Q., 168, who is brought to our attention at the time this chapter is being written. According to report, Tom "is reading everything." His grandmother, who has a professional interest in books for children, has a "theory of reading to children when they are but a few months old and thus capturing their natural curiosity, and has thus 'produced' several precocious children." Whether this particular practice, reminiscent of Harold Burtt's reading Greek to his infant son,[1] or the contagion of the grandmother's interest

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[1] Burtt (44) found that years later the boy was able to commit to memory passages from the Greek language which he had heard as an infant in fewer repetitions than other selections of the same length which he had never heard before.

in reading in general, is responsible for the results is not of present concern. On examination, Tom lived up to his "advance notices," as the following excerpts from the examiner's report indicate.

Tom was enthusiastic about all the parts of the test of intelligence, but less interested in the reading tests. He appeared somewhat fatigued after the Binet (Revised Stanford-Binet Scale, Form L), and the standardized reading test offered no challenge to him. His social and emotional reactions were throughout even more mature than those of the average eight-year-old (his mental age). He was courteous, cooperative, friendly, and completely sensitive to the test situation.

Reading and Report: year X, 3. (i.e., the third test of the battery of tests at age 10 of the Stanford-Binet.) Tom read the paragraph smoothly, with excellent intonation and inflection, with no errors, in 28 seconds, and gave ten memories.

Tom was tired after the Binet test, and although obedient and cooperative, he was only slightly interested in the standardized reading test. Furthermore, the test chosen (Metropolitan Reading Test for Grades 3-4-5) was so far below his capacity mechanically, and also so far below his interest level, that it offered little challenge. However, a test on a mechanically higher level would have placed too great a strain on his comprehension. Mechanically, he can read smoothly on a fifth or sixth grade level, and his powers of word analysis are on an even higher level. But his vocabulary is too limited for adequate understanding of material above that level. For example, he read smoothly several pages of Edna McGuire's *Daniel Boone* from the American Adventure Series. But when questioned about the meaning of such words as "frontier," "pioneer," "wilderness," or "underbrush" he was unable to explain them.

In contrast, some children, with normal intelligence or better, even when brought up in cultured homes with books about and with apparently all the necessary incentives to learn, may not, through some circumstances, be "ready" at much older than the usual ages. The autobiography of Agnes Repplier, whose mother made the mistake of reading to her and *for* her too well and too long, provides an example:

I am ten years old, and I can read. There does not seem to be anything remarkable about this circumstance, seeing that most little girls of ten have been reading since they were seven; but it was not so with

me. Three years of intensive teaching have conquered the sluggish mind that could not be brought to see any connection between the casual and meaningless things called letters and all the sweetness and delight that lay between the covers of books.

And my nursery was rich in sweetness and delight. A big old-fashioned bookcase crammed with volumes—the best of them having been left behind by my half-brothers when they took their flight from home. *The Arabian Nights* with double columns of print, and those "small, square, agitating cuts" so dear to Henley's heart. *Popular Tales from the Norse*—wild reading that—and *Robinson Crusoe* with many woodcuts, and *Sanford and Merton*. Then came my own treasures: Miss Edgeworth's stories which I loved, and Miss Strickland's *Tales from History,* which I loved better still, and Hans Andersen's fairy tales, and *Undine,* and *Sintram,* and Tieck's *Elves,* and *Paul and Virginia,* and *The Nutcracker of Nuremberg,* and two sedate volumes of verse entitled *The Schoolgirl's Garland.*

This bookcase held all that was lovely to me in life, and when an edict, wise, harsh, and menacing, closed its doors, I was left, a wretched little Peri, standing tear-drenched in an arid wilderness. My mother, pardonably tired of the long years wasted on the first steps in the education of a child who she knew was not a fool, gave strict orders that no one should read me a line. The world of reality closed in upon me, and what did the world of reality mean in 1867 to a little girl whose days were uniformly uneventful? A walk in the dull city streets, a skipping rope on my own pavement, and a patchwork quilt which I was well aware would never reach fulfillment. Amid these depressing surroundings I spent a few days of blank despair. Then I sized up the situation, surrendered at discretion, and quickly, though not easily, learned to read (273, pp. 3-4).

The movies and the radio, and now television, may occasionally equal a too indulgent parent in dulling a child's interest and initiative in learning to read.

The implications of the above cases and of the above considerations should make one skeptical of the setting of any precise time as to when a given child is ready to read, or even when children on the average are ready, unless one defines exactly for what sort of reading or for what kind of instruction he is to be ready. The readying of the material for the learner *is* a phase of reading readiness. The child who came to his remedial teacher asking for a book which had "a little on a page" illustrates one

of the requirements which sometimes helps. Books with too many things at a time confuse the young reader. Even some of the pictures in books designed for children are cluttered up with too many things. Although the pictures are intended for a good purpose, their very complexity at first sight is confusing. How important "a little on a page" may be in capturing and holding the attention even of the adult is strikingly illustrated by the prospectus of a great general hospital for children in its appeal for support. The brochure, about the size of the magazine section of a newspaper, designed to capture the attention of benefactors, perhaps benefactors of great wealth, has on its cover a single phrase—Because of You—and on its first page —Resolved to Live—followed on the next page by an appealing picture of a young boy, with as little on the page in the way of symbols as a preprimer might have. Certainly the nature and organization of the material must have some effect on the age and level of maturity at which children can be induced to attempt their first lessons in reading. If a pupil is not yet six years of (mental) age, he may not, to be sure, be ready to read by the methods which have been found suitable for six-year-olds. However, even if he is but five and happens to live in a city in which the average age for admission to the first grade is five years, he will find teachers who have suited the ways and materials to his age level. And leaving aside for the time being the question of whether or not it is desirable, as a general practice, to have children take the first steps to reading at these tenderer ages, it may be well to note that by suiting the methods and materials of instruction to their mental age level, three-year-old children have been taught the rudiments of reading in at least one regular public school.

Teaching the Young Learner by Readying the Materials. This school, which serves as the laboratory and demonstration department of the Rhode Island College of Education, has for years made it a practice of readying the materials of instruction so that normal youngsters of three, four, and five years of age could begin to read. This is more than taking the first step toward reading. It is actually taking the first step in reading.

The method followed in the program, which used to be called the Craig Method, consists of a modified kinesthetic approach. Bird, who has described the procedure, reports that the incentives for work include "large script letters and word forms made by the teachers by dusting carborundum powder on melted glue applied to cardboard with a brush" (27, p. 539). These and other materials are within easy reach, an open invitation to the children to begin using them spontaneously. Bird continues with the observation that normal children "naturally investigate the rough surface of the letter and word forms and are soon ready to be shown their proper use" (27, p. 539). The method begins to look like the efforts which were once made to teach children their A, B, C's by having them trace letters made of velvet or sandpaper. Bird settles the matter in her next sentence by explaining that the children are then taught "how to move the first two fingers lightly over the carborundum letters and words" (27, p. 539). "By this means," she concludes, "they gain a tactual-kinesthetic-visual-auditory impression of the symbols" (27, p. 539). This last hyphenated series of words means, of course, that as the children touch or move their fingers over the letters, they also look at the letters intently and repeat them after the teacher, so that after a while the appearance of the letters and words becomes associated with their proper enunciation. Long experience with the method has proved to Bird's satisfaction that it is successful.

Another effort at simplifying beginning reading and writing is the so-called Calvert Method developed by Hillyer.[2] It offers the same opportunities as the Craig Method for developing strong kinesthetic feelings for words, in that it holds that writing should begin at the same time as reading. Introducing writing at the start may even be said to teach reading, since the child can ordinarily read what he has written and he may not be able to write what he has read. Reading normally precedes writing in the language sequence, and children come to recognize many words visually which they cannot write. In the light of this common observation, one may ask why writing is neces-

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[2] This method is incorporated into a remedial reading service established by the Calvert School, Baltimore, Maryland.

sary at all. Be that as it may, successful results have been claimed for the Calvert Method.

Perhaps the best known effort to teach the very young to read is the work of Davidson (66). The subjects of her experiment were three groups of preschool children: one was a group of five bright three-year-old children; another a group of four normal children who had reached their fourth birthday; and the last a group of four dull youngsters who were five years old. The mental age of all groups was four. The object of the study was to find out whether children of this mental age could be taught to read, and if so, whether, with mental age constant, the bright, average, and dull would all learn alike. Geometric patterns were used to introduce the subjects to reading. These patterns were solid in form and carried the shape of words. The purpose of these materials was to teach the children the rough geometric patterns of words. Matching exercises were used to that end. Later the children were called upon to match the geometric shapes with the actual words of which they were the shadow. According to Davidson, this approach "served to bridge the gap between no knowledge of printed word symbols and knowledge and interest in them" (66, p. 167). Action sentences and word-picture vocabulary were used to supplement the practice with the block designs. The reading lessons were a daily event, and each lesson was ten minutes in length. The experiment extended over a period of four and a half months. Evidence of progress was found with each group. The bright learned more rapidly than the dull. The average number of words which the children were able to recognize out of context at the close of the experiment was 129 for the bright group, 55 for the normal subjects, and 40 for the dull youngsters. There were individual differences in each group, and the number of words which the children were variously able to recognize ranged from 20 to 269. On a standardized test of reading achievement, the average performance of the bright group exceeded the norm for children at the end of Grade IB. Two of these children exceeded the norm for Grade IA. One was a tot who was only three years and four and a half months old, the other a youngster who was three years and eight months

old. The most successful case of all, when retested at age three years seven months, had come up to the norm for the average eight-year-old child in the second grade. Davidson was inclined to attribute her results to "the special method developed . . ., with its great simplification of difficulties" (66, p. 254).

In England, children are regularly introduced to reading at the age of five. Winch (359) has described the methods of teaching beginning reading employed in England, and he has reported that these methods are usually successful with five-year-old pupils.

Time Consumed in Teaching the Slow or Immature to Read and the Permanence of the Results. Two questions arise with reference to the above studies: Is the effort worth it? Are the results permanent? Boney and Agnew (34) have conducted an investigation which bears on the first question. The account of their work involves a description of a program of adjusted instruction for pupils who were slow to learn to read in the primary grades of the Nassau School, East Orange, New Jersey. By way of a proviso, the statement was added in the report that "We continue, however, to treat the child who appears destined not to read in the first grade as if we could make him read" (34, p. 183). The claim is made in the article that 29 of 35 pupils who had been subjected to the program in previous studies "were able to work successfully in a fourth grade that accommodated pupils one year below grade norm" (34, p. 183). The task which Boney and Agnew set for themselves in their investigation was to follow the reading progress of twenty pupils through the primary grades and to measure the number of minutes per year the teacher gave each child. The pupils advanced at widely different rates, inasmuch as a variety of aptitude was represented in the group. The slower pupils took overwhelmingly more of the teacher's time and had less to show for it in the end. The results did not show that it is impossible to teach the slow group to read, but the authors question whether the time required is practical in large classes or whether it is time wisely invested after all, especially as it takes much less effort to produce the same amount of reading growth at a

later stage. Some of the slower pupils in Boney and Agnew's study required from six to ten times as much teacher time to grow a month in reading in the first grade as they did to gain a month in the third grade.

The question of the permanence of the gains achieved through special efforts to teach immature children to read has been largely neglected. In the above cited work of Dunklin, the question was classified under problems for future study. Roslow (283) was another who found that children with mental ages of less than six and below average intelligence quotients can learn to read if skillfully taught, but here again no data were offered concerning the durability of the results of such instruction. Davidson's investigation was limited by a similar failure to measure the remote effect of her program of teaching reading to preschool children. The work of Keister (194), however, is directly to the point. His results indicate that it is very unlikely that anything is gained in the long run from premature attempts to teach children to read. He followed the progress made in reading by three groups of children who were mainly five years old. With the help of progressive methods, these children were able to make normal progress during the first year; that is, they met the test norm for the first grade at the end of the year. The gains made, however, seemed to lack permanence and tended to disappear during the summer vacation between Grades I and II. The children had forgotten so much that when they returned to school they were for the most part far from ready for the second grade. They did not subsequently recover their losses, but tended to remain behind by about as much as they were at the beginning of the second grade. These results can be interpreted to mean that it might have been better to wait in the first place until the children were older before introducing them to reading.

Remedial Reading and the "Forcing" Method. Remedial reading has been much in vogue of late as a means of alleviating reading failures. The literature is filled with accounts of remedial-reading experiments and projects. In general, these reports are extremely favorable to the cause of remedial reading. On

the basis of a review of 54 outstanding studies on diagnostic and remedial reading, Tinker arrived at the optimistic conclusion that when suitable measures are taken "reading handicaps can be largely overcome or entirely eliminated" (335, p. 301). The reports on which this conclusion is based must stand on their own merits. Young (366) and others have found that remedial reading is pretty hopeless in more cases than not. Perhaps those who have published negative findings have had the difficult cases to handle. The roots of reading disabilities are often planted deep. Possibly the right approach was not used. Some of the poorest teaching at times passes for remedial reading. Even at its best, however, remedial reading seems quite out of order in the first grade, regardless of its possible value in the higher grades. After all is said and done, most failures in reading in the first grade can be put down to immaturity. We can agree with Hobson that in such cases "remedial techniques cannot prove effective" (168, p. 30). The resistance which many older children manifest toward reading can often be attributed to pressure to read before the child is ready for it. In a study of 83 disabled readers from the Detroit schools, Whipple reports that "in fifty-nine cases (probably a conservative estimate) the evidence was indisputable that introducing the child to reading too soon was a major cause of his later reading difficulties" (353, p. 530). In another study of 22 cases of reading disability, Jensen classified nine as neurotic, which he strongly attributed to "the unrelenting pressure exerted to get him (the child) to read when he is incapable of reading" (186, p. 543).

"Forcing" Versus "Pacing." There was a time when it was widely believed that the way to get children to read was to start early and give them a good foundation. This belief, which applied not only to reading but to other habits and skills as well, is commonly held today by parents and others who say, "There is nothing like starting early," or, "You can't start early enough." Many parents attribute the reading handicaps of their children to the idea that they did not receive a good foundation early in the grades. In a sense, what we have here called

the "forcing" method is a carry-over of this old philosophy. Schonell, an English educator, has suggested an alternative approach which seems to be more in keeping with the trend of modern educational thought. The following passage is taken from his fine little volume, *The Psychology and Teaching of Reading:*

> Young immature minds need opportunity and time to "sort things out," to understand what they are doing, and to see the purpose in the operations with which they are confronted. My strongest plea in the teaching of reading is, don't hurry the children, don't expect too much in the early stages—do all you can to provide a language background. This slower, wider approach will repay doubly later on. The teaching of both reading and numbers would greatly benefit if we allowed children time to really understand and assimilate, indirectly and informally, at their own pace and through carefully planned experiences, the fundamental concepts in these two subjects, namely, the meaning of language and the meaning of numbers (294, p. 6).

We are not in this instance concerned with number, but, as Schonell notes, reading and arithmetic present many of the same problems to the teacher. The policy he advocates is essentially the "pacing" method as opposed to "forcing." It is time to turn to the "pacing" method to see what its sponsors have to say for themselves.

"Pacing" as an Educational Method.—The exponents of growth do not deny that children can be made to do things which they might not do for a while in a more permissive environment. They do question whether anything is gained in the end. While admitting that the total evidence is inconclusive, Olson and Hughes (250) doubt whether forcing methods produce anything but a temporary effect of very limited size. They prefer "pacing" as a general principle. "Pacing" methods are keyed to the developmental pattern of the child. Each child, when ready, is given the individual help and encouragement he needs to learn to read. Much reliance is placed on the "seeking behavior" of children. Olson and Hughes have offered the following statement of this behavior:

Differences in growth among children of the same age make for differences in reaction to the environment that is supplied. The child is not a passive recipient of stimulation. He reaches out for it according to the maturity of his total and partial growth and the energy at his disposal. He reacts selectively to the surroundings that are supplied and creates his own world of experience within them. He tends to reject the experiences for which he is not ready. Teachers may make full use of "seeking" behavior by providing a school environment in which children may find suitable experiences of a wide variety in kind and difficulty. No narrowly conceived curriculum of fixed content can attain this goal (250, p. 61).

The Principle of Self-Selection. According to the concept which Olson and Hughes have developed in this passage, the child must more or less be his own judge of whether or not he is to begin reading. Olson has elsewhere called it the principle of self-selection, and he applies it to reading as follows:

The self-selection principle as applied to first reading implies that a teacher will provide help and a suitable environment, but the child himself will be the judge of whether or not and at what time he should be consuming reading materials. Observant teachers have long been accustomed to looking for clues, as the child, when ready, starts his *seeking* behavior. The nature of this behavior has not been too well documented, but it is known that it begins early in mature children and is reflected in the time they spend with picture books, in the questions they ask, and in other evidences of interest. Under the self-selection principle, it is not uncommon to find a child reading before anyone is aware that he has had "instruction." One child who was reading well and entertaining others with her reading in the kindergarten was asked, "How did you learn to read?" She said, "Mother taught me 'and' and 'the.' When I came to school, I learned Mary and Ruth. The rest I just figured out for myself." Such examples occur from time to time in a kindergarten and frequently in the first grade among children who are very mature. The process seems to occur with equal ease among the others if the teacher and the parents are willing to *relax, wait, and let nature take its course.* At their worst, remedial reading techniques attempt to produce an abnormality in the child's growth. At their best, remedial techniques are based on the "pacing" principle, insure an adequate supply of nurture, and involve the education of all concerned in the acceptance of the normality of variation from averages (243, pp. 53-54).

This statement describes in theory the practice employed in teaching reading in the University of Michigan Elementary School. Repeated tests over the years have shown that all children learn to read sooner or later. According to the test norms, the results for the different age groups represented in the school have not differed significantly from what one would expect from comparable groups enrolled elsewhere.

Children learn to talk without special tutelage. If they have the ears to hear and the machinery with which to respond, most children who are brought up in a normal speech environment readily learn to talk of their own accord. The parents need only be willing to wait. Is it not possible that, if given time, children might also learn to read without special instruction in much the same natural fashion that they earlier learned to talk? A few practical school workers are coming around to this viewpoint, notably Boney, who has written:

It is probably true that the ease and efficiency with which children learn to talk are due largely to the factors of self-motivation and to maturity. The home does not set up special pedagogical methods to induce the child to talk before he is ready. Parents are not disturbed at all if a child waits to begin his talking until he is twenty-four months old. Fortunately, no one has yet found that such delay makes a difference in one's success in later life. Thus without systematic instruction, without a vocabulary quotient to govern the repetition of words, and without a master word list made in Chicago or New York, he yet learns to talk. Is there anyone who will say that this natural method of instruction is less efficient than the methods we have thus far devised for reading (32, pp. 139-40)?

Boney has attempted to find an answer to his own question, and the report of his findings and experiences is well worth reviewing in detail.

Learning to Read by the Natural Method. Boney's laboratory has consisted of the Nassau School, East Orange, New Jersey, where he has served as principal and where the staff over the years have shown a commendable will to experiment with new methods in the beginning reading program. Through the years, Boney has become increasingly skeptical of special

efforts to get all children to learn to read in the first grade. Boney and Agnew (34) were the ones who reported in 1937 that they continued in the Nassau School experiments to treat all children in the first grade as if they could be made to begin to read. Boney expresses his change of heart in the following passage from the report which is presently under review and which appeared in 1939:

Learning to read is for many children a difficult and frequently a distasteful experience. Even our best methods of teaching this skill appear to be very wasteful. A high proportion of the primary teacher's time is spent on it without success. A few days ago I saw a child who could not read a primer, and who had been given daily attention for three years by teachers who used the best books and materials available. Ten years ago we would have poured out our sympathy for this youngster as one of our overgrown, dejected primary failures. Today this is not the case, for he has been promoted each year. We have evidence that this is good practice, for he can do art, social studies, music, science about as well as those members of his group who can read fluently (32, p. 139).

Because this wastefulness is not so noticeable in learning to talk, Boney has offered the argument quoted previously and proposed that children be inducted into reading in the same natural fashion that they learned to talk. To a limited extent at least, this had become the policy in the Nassau School by 1939. The point is well taken in Boney's report that children will learn to talk only if they are brought up in a talking environment. The first requirement, therefore, of the natural method of learning to read is a reading environment. There must be an opportunity for reading and a social demand for it. The gist of the argument is that if these conditions are met, the children should learn to read just as inevitably as they learned to talk, so long as the same patience is exercised and the same opportunity for individual growth is granted.

The natural method does pretty well describe the way in which bright children learn to read. Terman and Oden (316) have found that nearly 50 per cent of mentally gifted children learn to read before they enter school, and the history of genius is replete with examples of precocious reading. Hollingworth

(172) has described a group of children with I.Q.'s above 180 who learned to read at an average age of about three. Gifted children early become interested in what words say—the signs on corn flakes packages, the labels on cans, street signs, the signs on store windows, traffic signals, and the like. If someone is around to tell them the words, they quickly pick up a sight vocabulary and are reading before anyone is aware of how it has happened. Carroll (51) has reported the case of one gifted child whose primer consisted of signboards on the highways. This child's first words were "Four Roses Whiskey." Simirearly, Kyte (202) has found that many intelligent children can be excused from their spelling lessons at school with the assurance that they will make normal progress under their own power. Other studies indicate that teaching a word in a particular grade may have no lasting effect on the ability of the children to spell it. Courtis (59) has been interested in this problem, and Figure 13 is reproduced from his work. The figure follows the progress of a group of children to spell two words, one of which was not taught in school and the other of which was introduced into the spelling lists of the seventh grade. The word which was not taught follows a regular pattern of growth until the twelfth grade, where almost all of the children were able to spell it correctly. The other word pursued much the same path up to the sixth grade. A sudden rise in the curve is apparent when teaching begins in the seventh grade. The difference between where the curve would have gone and where it did go at this point may be attributed to the teaching. However, the curve quickly levels off and soon resumes its former course. The teaching seems to have had no more than a temporary hothousing effect, which petered out once the pressure to learn to spell the word was removed. In the end, both words were spelled correctly with about equal frequency, which probably would have been the case had neither word been taught. Results having the same import have been obtained by Arnold (14). Learning to read and spell are closely related, and it is a serious question as to how much growth in either can be hurried up through the pressure of school lessons alone.
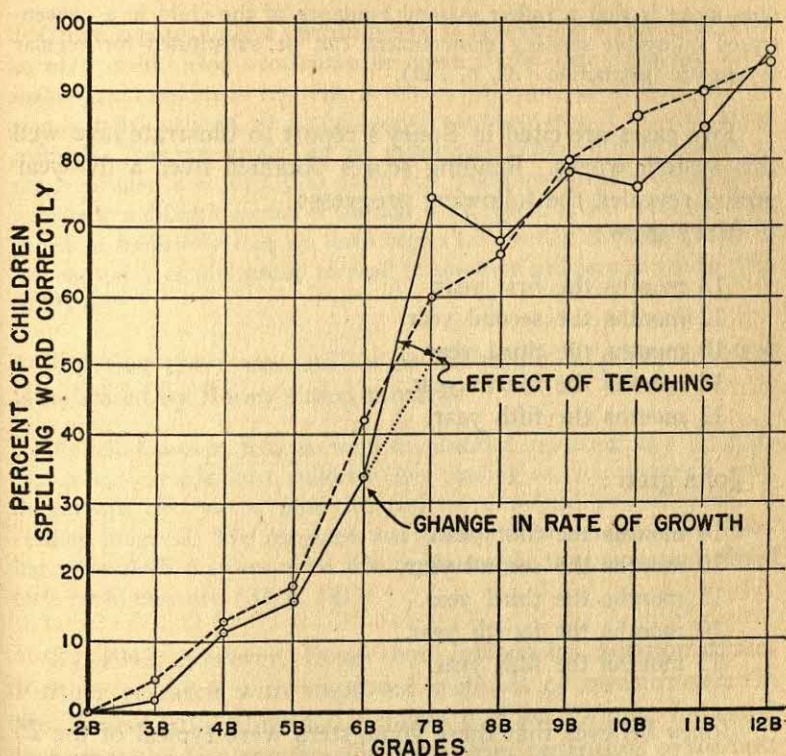
FIG. 13.—The effect of teaching on learning to spell (solid line, word taught; broken line, word not taught). From Courtis (59, p. 94), by per- mission of the American Association for Health, Physical Education, and Recreation.

Boney's own experience is that approximately 25 per cent of the Nassau group have learned to read before the regular reading instruction begins in December of the first grade. Of these children and of their subsequent management in the read- ing program, Boney has written:

The quarter of the children who are reading by the first of De- cember have made a sufficient start to enable them to grow independently into the reading process with little or no help from the teacher after the first half of the first grade. Of course, this does not mean that no attention is paid to this group after this initial experience. What it

does mean is that a rather general guidance of the child in a concentrated enjoyable reading environment can be substituted for regular systematic instruction (32, p. 140).

Two cases are cited in Boney's report to illustrate how well this system works. Reading scores obtained over a five-year period revealed the following progress:

Mary grew:

13 months the first year.
12 months the second year.
10 months the third year.
15 months the fourth year.
12 months the fifth year.

John grew:

18 months the first year.
10 months the second year.
15 months the third year.
10 months the fourth year.
15 months the fifth year.

Boney believes that these youngsters were typical of the 25 per cent who learned to read by themselves. Both children made normal progress without any formal instruction. At the end of her fifth year in school, Mary was more than a year ahead of her class in reading achievement. The aid most frequently employed by the precocious group was "asking another person—usually the teacher" (32, p. 140). This method of gaining help is consistent with the experience at the University of Michigan Elementary School where similar results have been obtained from rapidly growing children. It is an example of what Olson and Hughes have described as *"seeking* behavior," in the passage quoted above.

We have left to account for the 75 per cent of children in the Nassau School who ordinarily did not learn to read before instruction began in December. Of his experience with these children, Boney reports:

There appears to be a special period of awakening in the experience of each child. This awakening or spurt is the time when the child makes rapid strides in learning to read. Since all our reading instruction is individualistic, we probably notice it more than if we used group methods. It is not unusual in our experience to have a child remain on the preprimer level for a year and a half, and then advance within three months to a difficult second or an easy third reader level. This has happened so frequently that we have begun to question the advisability of forcing many of this group to read in the first and second grades (32, p. 141).

But that there was still some hesitation in policy in 1939 is indicated by Boney's next remark:

We felt, however, that we were not justified in setting up a program that would exclude some children from reading for six months, a year, or perhaps two years, until we had more refined measurements of reading progress. We reasoned that perhaps slow readers were learning more skills than we were able to observe or than our standardized tests could measure (32, p. 141).

By 1942, however, Boney had revised his position again. Further research with improved methods of measurement in the Nassau and Elmwood Schools of East Orange indicated that some children remain slow for a time, regardless of the best efforts of the teacher and of the methods and materials used. Forcing reading on such children runs the risk of driving them to cover. The strain is often so great that neurotic symptoms appear. This suffering can be relieved by delaying beginning reading until the children are ready. There is no convincing evidence that any of the children will be harmed by the delay. There is evidence that the children who are slow often enter spurts when they make progress at a rate far in excess of anything that can be produced earlier through the most strenuous efforts. The children may not enter these spurts if they are first driven away from reading and become emotionally inhibited toward the whole subject, as can happen as a consequence of the flat requirement that all children learn to read in the first grade. Boney expressed his skepticism of this requirement in 1939. These last experiments served pretty well to

settle the matter in his mind. To quote him once more from the conclusions reached in his 1942 report:

On the basis of this experience, we advance the hypothesis that if during the first year and a half a child experiences too much difficulty in reading, he should not be given daily reading instruction. We believe it can be delayed without detriment to the child's reading progress. The time of beginning daily reading instruction will be determined by the teacher, who will have the child in a reading readiness environment and also give him frequent opportunities to read. The criteria for beginning reading instruction will consist primarily of his power of retaining words and his interest in reading. At the present time we are not in a position even to suggest the degree of power or interest necessary before daily reading instruction is begun. We are strongly inclined to believe that, whatever formula may be devised, it must be based upon the very complex physical and social pattern of an individual, and not upon a single index. Reading is only one phase of a total growth, and no action in its behalf should jeopardize other important values (35, p. 133).

Throughout his work, Boney has manifested an admirable disposition to be guided by the results of his research. Actually, his conclusions are indicative of a trend. Coming from a practical school man, his testimony is all the more convincing. Remedial reading is in for some rough weather by virtue of many of the same arguments. Too often in the past, the corrective measures employed have amounted to efforts to force growth. Anyone who has served in a reading clinic knows that many of the same cases keep coming back year after year, that they remain the same old problems, that they do not recover. Children in the upper grades can no more be made to conform to standard requirements than can children in the first grade. If this fact alone were accepted, many remedial programs would lose the reason for their existence. The low end of the distribution is here to stay. The best remedial teaching is individual teaching, which involves finding the right books for the child and getting down to his level. Remedial reading of the forcing variety has seen its heyday. Even Betts (23) has described remedial reading as the fad of the 1930's. As for beginning reading, Boney ventures this final optimistic prediction: "We

may soon look forward to a beginning reading program that is spread over a three-year period which the school will accept with as much ease as the home accepts the natural variation among children in cutting teeth, walking, and talking" (33, p. 172).

"Delaying" as an Educational Method.—In 1931, Morphett and Washburne (234) reported the results of an investigation in which it was found that failures in reading among first-grade children in Winnetka, Illinois, decreased up to a mental age of six and a half years, and that after that point almost everyone passed. This finding has frequently been cited as indicating that a mental age of six and a half years is necessary in order to learn to read. Some schools, therefore, have adopted the policy of postponing the first lessons in reading until the children have a mental age of six and a half years.

Postponing reading until the children are older and mentally more mature is referred to as the "delaying" method, to distinguish it from "pacing." "Pacing" implies that the school program be adapted to the *"seeking* behavior" of the children. This may result in delay for some children but not for others. "Delaying" implies postponing the introduction of a subject or skill until a later time, which may, in turn, exclude some children from the experience when they are ready. The idea behind the "delaying" method is that more of the children will succeed at the task when they are older.

Of course it may be argued that Morphett and Washburne's results show only what may happen under one program of instruction. The study does not tell how the results might vary according to the difficulty of the materials used, the methods of teaching employed, and the passing standards in force. This is one of the points that Gates has often emphasized.

Relationship Between Reading Achievement and Mental Maturity. Whatever else may be said, however, a distinct relationship does exist between reading achievement and mental status. Morphett and Washburne were not the first or the last to advocate a minimum mental age for beginning reading. In a study of the causes of nonpromotion in the first grade of

schools in Los Angeles and San Diego, McLaughlin (220) reported that the chief factor was insufficient mental maturity for learning to read. Raybold (269) also found that mental immaturity was the chief cause of nonpromotion in the first grade. Pupils entering the grade with a mental age of 76 months, however, were almost always promoted. A study by Thomson (318) revealed that children who have mental ages of at least six before reading instruction is begun like reading better and make faster progress than younger children. Results obtained by Dean (69) indicated that a mental age of six and a half years or better is needed to do average work in reading in the first grade. His data showed that pupils below this mental age failed in reading more times than not. Long experience in observing children in the first grade led Rosebrook (282) to conclude that no child should be expected to read before he has a mental age of six and a half or seven years. Others, notably Bigelow (25), have reached similar conclusions.

The obvious method, of course, of studying the relationship between reading achievement and mental age is by means of correlations. The amount of such evidence in the literature is enough to fill a book. Without exception, the correlations reported have been positive, and for the most part substantially high. In Morphett and Washburne's study, correlations ranging from .50 to .65 were obtained between Stanford-Binet and Detroit First Grade Intelligence Test mental ages and sight-word scores. In Dean's study, a correlation of .62 was obtained between Stanford-Binet mental age and the Metropolitan Reading Achievement Test. In another study involving first-grade youngsters, Petty (258) found a correlation of .52 between mental age on the Herring Revision of the Binet-Simon Test and reading as measured by a modified form of the Lee-Clark Reading Readiness Test. Peck and McGlothlin (255) reported a correlation of .62 between mental age on the Cole-Vincent Group Intelligence Test for School Entrants and the Metropolitan Reading Achievement Test. Huggett (181) obtained a correlation of .53 between the Rhode Island Intelligence Test and the Detroit Reading Test for a kindergarten group. A correlation of .50 between mental age and paragraph reading

was reported for a group of first-grade pupils by the Department of Educational Research of the University of Ontario (262). Correlations of .62, .55, .44, and .34 between mental age and reading scores were obtained for four different groups of beginning readers by Gates (120). In this study the highest coefficients were found for the groups who received the best instruction, and the lowest for the classes which had the poorest teaching. In one of the first studies of the relation of mental age to the reading achievement of first-grade youngsters, Deputy (79) found a correlation of .70 between reading achievement and the Pintner-Cunningham Primary Mental Test.

Reading readiness tests have shown the same positive and relatively high correlation with success in beginning reading. Studies have revealed that reading readiness and mental tests measure essentially the same factors; that is, the correlations between mental tests and reading readiness tests are about as high as the correlations between the mental tests themselves. Grant (136) obtained a correlation of .81 between the Pintner-Cunningham Primary Mental Test and the Metropolitan Reading Readiness Test, and Kottmeyer (200), a correlation of .77 between the Detroit Beginning First-Grade Intelligence Test and the Metropolitan Reading Readiness Test. For predicting achievement in reading, most mental and reading readiness tests can be used interchangeably. In another study Grant (137) obtained a correlation of .64 between the Metropolitan Reading Readiness Test and reading achievement, and one of .63 between the Pintner-Cunningham Mental Test and the same reading criterion. Correlations between reading achievement and reading readiness tests have generally run between .40 and .70. The addition of a reading readiness score to mental age does not, in general, materially increase the reliability of the prediction. In his study, Dean reported a multiple correlation of .64 between reading achievement and mental age and reading readiness score combined, and a first-order correlation of .62 between reading achievement and mental age alone.

The evidence does not permit the conclusion that mental age is the only factor making for success in beginning reading. There doubtless are other conditions which include physical

and social maturity, cultural background, language habits, and background of experience. However, mental age is probably the most important single factor in the majority of cases. We can accept Steinbach's finding that "a mental age of less than 6-6 does not necessarily result in a retardation in reading" (305, p. 105). We must also agree that, by and large, the chances for success increase as the child matures mentally. This is the reasoning behind proposals for postponing beginning reading instruction until the children are older and mentally more mature. These proposals do not necessarily imply that methods of teaching are unimportant. It is only that under any method the child's prospects improve as he grows mentally, and there is less chance for frustration in the case of the slow-growing.

The Effects of Delaying Beginning Instruction in Reading. On the whole, studies which have attempted to evaluate the practice of delaying initial reading have come out on the credit side of the ledger. The study of Washburne (351) may be singled out for comment. In this particular study, which was carried out in Winnetka, one first-grade group did not launch on formal reading until the middle of the second grade. For each of these children, which constituted the experimental group, three control subjects were found who had the same mental age, chronological age, and intelligence quotient, and who were similar in socioeconomic background. No mention was made of the sex of the cases. The control group started reading, as usual, in the first grade. During the course of the experiment, which at the time of the report had been carried to the eighth grade, the subjects of both groups were tested from time to time for their reading achievement. The experimental group was small to begin with, the exact number of cases in it was not stipulated in the report, and the results for three of the experimental subjects were not counted, due to complications of one sort or another. Nearly half of the experimental group transferred from the Winnetka schools before the end of the eighth grade. According to the report, however, the average results for the matched cases which remained intact each time the tests were administered showed that the experimental group was

behind the control group when both were first tested in the middle of the second grade, but that the experimental group caught up with the control group by the end of the third grade, excelled the control group by a half year at the end of the fourth grade, and actually came to exceed the control group by a year and a half at the end of the eighth grade.

When it comes to evaluating the results of Washburne's experiment, the first question that naturally arises is why the experimental group went on eventually to surpass the performance of the control group by increasing amounts with the passage of time. Is the explanation that, after a year and a half delay in starting reading, the experimental group had become so much maturer that its members did not make the inhibiting mistakes that they might otherwise have made, and so were free of barriers that continued to obstruct the progress of the control group? Certainly that is one hypothesis. Before we can settle for this interpretation, however, there are certain other questions that must first be answered. Specifically, were the children who dropped out of the experimental group the laggards? Were there more girls in the experimental group than in the control group? Was this an example of what can happen when a group of children, or adults for that matter, are singled out for special attention and become known as the experimental group? Finally, what was done in the year and a half before the experimental subjects started reading that was better for them than reading itself? From the general experimentation in this field, such as McGraw's (219) familiar experiments with Johnny and Jimmy, we can be quite prepared for the fact that older and maturer children can learn many skills in much less time than younger and immature children. But when, as in Washburne's experiment, where many outside sources of variation did not seem under control, the group with delayed instruction actually came to exceed the group with usual instruction by as much as a year and a half, one cannot but harbor the thought that the halo associated with being an experimental group, selection, and the other factors mentioned may have accounted for the ultimate superiority of the experimental cases as much as that maturation had ironed out the course of learn-

ing for them. The question is not so much whether the delay helps, certainly it helps some children, but how much it helps. Do children actually become *better* readers, more or less for all time, when instruction is delayed than when it is not? At first glance, Washburne's results seem almost too good to be true, but that is something for future research to decide.

Prolonging the Preprimary Period. Many other workers have reported on experiments postponing the first lessons in reading, and the results have been favorable, as would be expected if the right children are singled out. Some schools have established special classes for prolonging the prereading period. The less mature are promoted from the kindergarten, not to the first grade but to a "junior primary" or to a "kindergarten extension," which really amounts to a new rung in the academic ladder midway between the kindergarten and the first grade. The maturer children skip the new grade and are passed directly to the first grade. The upshot is that the younger in mind and body are kept back an extra year or term. The plan is not necessarily a scheme to hoodwink parents, who would see through it anyway, although being retained in a "junior primary" or some other transition group still may not carry the onus which failure in the later grades does. It should also be said that growth is very rapid during infancy and early childhood. A brief reprieve, during the preprimary period, when growth is relatively rapid, might well spell the difference between success and failure in the first grade.

One of the first efforts to bridge the gap between kindergarten and regular first grade for immature children was made in the San Fernando Valley area of California. Surveys in the area had revealed that the rate of nonpromotion in the district was approximately 21 per cent at the end of each half of the first grade. Further studies disclosed that the chief cause of this high rate of failure was insufficient mental maturity to learn to read. After a tryout of several different mental ages, a mental age of 76 months was adopted as the best dividing line between success and failure in beginning reading. Children with mental ages below this figure, and who were otherwise immature, were

enrolled in special groups called "Transition B1" classes. No formal reading was taught in these classes. The children were given a variety of other experiences, however, in more fruitful areas of growth. Studies designed to evaluate this program indicated that the children who had been enrolled in the transition groups made highly satisfactory progress when they later entered the regular B1 grade. Children with comparable mental ages who had been assigned directly to the regular grade did not prosper nearly so well. While the latter were promoted to Grade A1 at the usual time, their reading achievement remained low for the grade, as measured by a standard test. The San Fernando Valley project has been described in detail by Raybold (269). The plan was subsequently adopted by the schools of Los Angeles, where Woods (362) has reported on its operation. Her data revealed that 50.9 per cent of the children entering the first grade in Los Angeles had mental ages of less than 76 months. The percentage of the total B1 enrollment placed in transition sections was 31.8. The transition classes succeeded in reducing the number of pupils retained at the B1 level from 20 to 11.4 per cent. In a survey of 271 school systems in California, Russell and Hill (289) found that 43 per cent had established special transition classes for five- and six-year-old pupils who were too immature to enter regular first grades.

Johnson (187) has described a prereading program which was put into operation in the Chicago schools in 1939, where special IC classes have been established for the children who seem too immature for classification in IB. At the time of Johnson's report, about 10 per cent of the first-grade group had been placed in these IC classes. The success of the program is indicated by the fact that 84 per cent of these cases were prepared for admission to regular IB classes in five months or less.

Delayed Lessons for the Mentally Retarded. The need for postponing the first lessons in reading, in the case of children who are really mentally retarded, has been emphasized by Hegge (155). The mentally deficient are likely to enter the public schools at the same age as normal children. For the average child, this age is six. The average child also has a

mental age of six at the time. Not so the mentally retarded child. His mental age at a life age of six will depend on his relative brightness or intelligence quotient. If, for example, the child has an intelligence quotient of 70, his mental age, obtained by multiplying the intelligence quotient by chronological age and replacing the decimal, is 4.2 years, hardly enough for beginning reading by any standard. Some delay in initial reading is inevitable in such a case. Kirk (197) has estimated the chronological ages at which mentally retarded children of varying intelligence quotients become ready for beginning reading, as shown in Table VII. These estimates can serve only

TABLE VII

AGE OF BEGINNING READING FOR MENTALLY RETARDED CHILDREN
OF VARYING INTELLIGENCE LEVELS

Intelligence Quotient	Age of Beginning Reading
Below 50	14–16
50–59	10–12
60–69	9–10
70–79	8– 9

From Kirk (197, p. 28), by permission of the Houghton Mifflin Co.

as a general guide. The most severely retarded may never learn to read more than a few words. Those with the higher intelligence quotients often make excellent progress if the circumstances are favorable.

Children with low intelligence quotients present a perpetual problem in the public schools. A child with an intelligence quotient of 70 may not reach a mental age of even six until he is nine years old. The public school setup does not lend itself to admitting children to the first grade at an age of nine. Keeping the child in the first grade for three years is no solution. Segregating the children does not always work, for if a child is placed in a slow group, and especially one which is largely composed of children of a lower economic and social stratum than his, parents are disturbed, take out their resentment on the children, and the latter take it out on the school. Letting all

children advance through school together may remain the most painless way. This practice, as applied to first reading, means that prereading activities would continue for individual pupils for as many grades as necessary. The children can profit in other ways while waiting to learn to read. Teachers should be qualified to give help in reading at whatever level is necessary, and in any case the problem is one with which schools must learn to cope. By getting down to the level of the pupils, and by relating reading to areas of interest, Farson (103) has obtained highly gratifying results with mentally retarded children within the framework of regular classes. No less gratifying than the gains achieved in reading was the associated improvement in social and personality adjustment. Schorling (295) has offered a number of excellent suggestions for improving the reading ability of slow-learning pupils in the secondary schools.

The need for having to delay reading instruction in the case of the feeble-minded child can be more easily met in institutions for the mentally deficient. Melcher (222, 223) has described a program which she has carried out at the Wayne County Training School in Northville, Michigan. The plan involves a prolonged period of preacademic work, featuring a reading readiness program and an activity program. The activity phase of the work consists of constructive activities, habit training, group cooperation and emotional control through social play, and supervised play out of doors. Boys under eleven years of age, with moron or borderline intelligence, are admitted to the program. They are transferred to the regular academic program when they reach the age of twelve, or at any time before twelve if their intelligence quotients rise above 80 or their mental ages come to exceed their educational ages by two years. The results of Melcher's studies show that, as a consequence of the prolonged preacademic program, the intelligence quotients of the children begin to rise, and that, after leaving the preacademic program, the youngsters tend to do slightly better academic work during the first year than is ordinarily expected of the normal child of the same grade, and finally, that behavior takes a turn for the better. The behavior changes include a reduction in the incidence of stealing and of such symptoms as

masturbation and enuresis, as well as a reduction in the amount of antagonism among the youngsters and of unwillingness to cooperate with the group. These problems are frequently reactions to frustration, and to get fewer of them indicates that the preacademic program was effective in removing some of the barriers that confound mentally retarded children in the usual school situation.

"Delaying" Versus "Pacing." The following remarkable passage can be found in Rousseau's *Émile,* remarkable because the concept of reading readiness is supposed to be a fairly new notion in educational circles:

I will add this one remark which constitutes an important maxim— viz., we usually obtain very surely and very quickly what we are in no haste to obtain. I am almost certain that Émile will know how to read and write perfectly before the age of ten, precisely because I care but very little whether he learns these things before the age of fifteen. I would much rather he would never know how to read than to buy this knowledge at the price of all that can make it useful. Of what use would reading be to him after he had been disgusted with it forever (285, p. 83)?

Serious proposals have been made for eliminating reading entirely from the first grade, and for postponing instruction until the children are eight or nine years old. These suggestions seem lacking in common sense. As Harris has rather aptly observed, "We do not make all of the people at a picnic delay their lunches because two or three are not yet hungry; and there seems to be no more reason to make children who are ready for reading wait because some other children are not ready" (151, p. 98). Some of the children will have learned to read even before entering the first grade. Others will be demanding help. The policy of delay does not take these individual differences sufficiently into account. For this reason, writers on growth nowadays are more inclined to stress "pacing." As Olson and Hughes say of the "pacing" method, "If this results in delay, delay there should be. If, on the other hand, some rapidly growing children seek reading and number experiences at an early age in nursery school and kindergarten,

there seems no good reason to exclude them" (250, p. 62). Pursuing the same point, Olson has elsewhere remarked that a child may become ready for reading "anywhere between chronological ages four and eight and even later" (245, p. 8).

The Place of Reading Readiness Activities in Prereading Programs

There is one aspect to these schemes for prolonging the prereading period and for postponing the first lessons in reading which we have only barely mentioned, namely, what is done during the period of delay? The usual practice is to devote at least part of the time to reading readiness activities. There are certain prereading abilities which can be recognized and to some extent fostered, such as the development of a good speaking vocabulary, the use of sentences in conversation, the association of ideas with pictures, the following of sequences of ideas in pictures (as in the comics) and in speech, the recognition of likenesses and differences in pictures and then in printed symbols, the following of a sequence of directions, and so forth. By sampling these and similar abilities, the general intelligence and various reading readiness tests give the teacher some idea of the youngster's readiness for reading. The chief function of prolonging the prereading period is to allow time for these traits to develop, and as Harrison has suggested, to "stimulate their development in a preparatory period of reading instruction" (152, p. 3). The idea that reading readiness can be stimulated by means of suitable activities forms the basis of many prereading programs, that is, these programs involve more than putting off reading and turning to other things— there is a direct attempt to ready the child for reading by giving him practice in the prereading skills. Describing the Chicago plan of IC classes, Johnson said the children were given "various types of prereading activities designed to develop the memory span; to increase ability to do abstract thinking and to correlate concepts with responses, such as color recognition, the observance of similarities and differences in size, shape, and direction; and to remember various word forms" (187, p. 340).

These activities were specifically designed to promote reading readiness, the better to assure success when the pupils were transferred to regular IB sections and the time for the first lessons in reading arrived.

Publishers of basal reader materials nowadays commonly include a reading readiness manual or two in their series of books. These manuals, which are essentially workbooks, are replete with ideas, schemes, and exercises for promoting the cause of reading readiness. These materials have a place in the reading program, just as the ideas and devices which the teacher herself may have for building up the prereading skills have a place. They make a contribution to the total school milieu. The question is how much can be claimed for the reading readiness activities as such. Is it possible to hasten the appearance of the prereading skills? Any environment worth talking about is stimulating and promotes growth in all areas, including the area of reading readiness. What more can be done? The same problem is involved here as in the case of attempts to hurry along the process of reading itself.

Prereading Programs with Emphasis on Promoting Reading Readiness.—Those who have written about or experimented with reading readiness programs are inclined to hail them as a success. We already have Johnson's testimony. Petersen (257) has described a very similar program which was carried out in the schools of Ironwood, Michigan, during the school year 1935-1936. As in the Chicago plan, the children who were not ready for reading at the start of the first grade were assigned to transition groups. In lieu of the regular instruction, these children engaged in activities and were given experiences calculated to induce reading readiness. They entered upon real reading when the teacher judged that they were ready. Standard reading tests administered in March and April indicated that the children who participated in this program compared favorably with the national norms for the first grade, although they were well below the average for the rest of the pupils who had entered reading directly, which was to be expected, since the latter were maturer and more advanced, to

begin with. With few exceptions, the mental age of the children entering the transition classes was five years or less. Petersen was inclined to pronounce her program a success. It would have been interesting, however, to compare the progress of the reading readiness group with that of a strictly comparable group which did not specifically receive the reading readiness instruction, or who plunged directly into the regular classwork. The use of such control groups was not a part of Petersen's study. It is possible that the children who came through the transition classes remained behind by about as much as they would have without the readiness training, although it should also be said that nothing was probably to be gained by rushing them into reading.

An investigation more nearly in the style of a controlled experiment was reported by Ring (276), who compared the progress of a group of children who were given a half year of readiness training in Grade I with that of two other groups of like size, chronological age, and mental age, who were denied this training and who entered the regular reading program at the usual time at the beginning of the year. As indicated by the Gates Primary Reading Test, the reading readiness group advanced at a faster rate when finally introduced to reading than did the control groups, much in the fashion that the experimental group overtook the control group in Washburne's experiment. By the end of their second and third years in school, the experimental cases had achieved the same status as the control cases, even though they had received five months less teaching in reading than the latter. What ultimate advantage the reading readiness activities held for the experimental subjects, aside from the saving in time and effort in learning to read, is hard to say. The teachers who participated in the experiment testified that they noted an improvement in the physical and emotional condition of the children in the reading readiness groups. Whatever the benefits, they may have resulted as much from the delayed start in learning to read as from the reading readiness activities themselves. A comparison with a third program, in which there was the same delay in introducing reading but no *special* drive on reading readiness, would have been interest-

ing in this case.   Still another attempt to evaluate the effect
of reading readiness instruction has been reported by Scott
(296).   She recommends reading readiness training but admits
that her own results are inconclusive.

Cultural Background and Reading Readiness. One fact
which the literature has repeatedly demonstrated is that children
who have been neglected at home or who come from barren
backgrounds do not learn to read as readily or as well as children
who have been more fortunate. Hilliard and Troxell (165)
have made an interesting study of this problem, and they have
suggested the role that the kindergarten might play in readying
underprivileged children for reading.   The subjects of their
investigation were two groups of kindergarten children, differ-
ing in richness of background as determined by such items as
amount of travel experience, opportunities to enjoy motion
pictures and the radio, the number of children's books in the
home, and a host of other factors dealing with the reading
environment at home. No children with intelligence quotients
below normal were included in either group. The children were
followed up for two years with reference to the progress made
in reading. A decided advantage appeared in favor of the rich-
background group. The meager-background group made lower
scores on reading readiness tests and on reading achievement
tests administered after the children had entered the first and
second grades. There were individual differences within each
group, and there was some overlapping in the distributions of
the test results between groups, but on the whole the meager-
background group suffered a clear disadvantage. As Hilliard
and Troxell state the matter, "Other factors being equal, this
study shows that children with rich backgrounds are more
strongly equipped to attack the printed page than are pupils of
meager backgrounds, because of enriched meanings and thought
which the former bring to this task." The authors continue,
"Research has discovered that one of the greatest difficulties
encountered in learning to read is lack of understanding of
words and ideas. Meanings grow through experiences and
contacts. Hence," the writers conclude, "one large task of the

kindergarten teacher is to enrich and broaden children's backgrounds" (165, p. 263).

The Kindergarten and Reading Readiness. Surprisingly or not, the literature does not show that a kindergarten experience has any great effect in facilitating the process of learning to read, possibly because the right children have not been involved. Risser and Elder (277) followed a kindergarten and nonkindergarten group through the first five grades of the Monticello and Union Township Schools, Monticello, Indiana, and were unable to demonstrate that the kindergarten group made significantly better progress. The differences between the average marks of the two groups in reading, writing, and arithmetic in all five grades were negligible. In writing and arithmetic, such slight differences as were obtained favored the nonkindergarten group almost as often as the kindergarten group. The differences in these subjects were obviously matters of chance. In reading, the differences favored the kindergarten group, but by such small margins that they can be ignored. The conspicuous finding was not how much effect the kindergarten had, but how little. In each subject and in each grade, the marks of the kindergarten and nonkindergarten groups were essentially a part of a common distribution. In another effort to measure the contribution of the kindergarten to beginning reading, Teegarden (313) found that 90 per cent of her subjects who came from superior homes made satisfactory reading scores in the first grade, whether they attended kindergarten or not. Of children from middle-class homes, 70 per cent of the kindergarten-trained made satisfactory progress, as compared with 56 per cent of nonkindergarten children. Of children from industrial districts, 40 per cent of a group with kindergarten experience were successful readers in the first grade, as compared with 34 per cent of a group without such training. These statistics indicate that the children from the middle-class and industrial districts had a slightly better chance to make a success of beginning reading by attending kindergarten than by not attending. On the whole, however, cultural level remained a more significant factor in that regard than attendance in a kindergarten.

Foreign-Language Handicaps and Reading Readiness. Another group of children who are likely to have difficulty learning to read are those who come from foreign-language-speaking families. Membership in such families was given as a most common cause of lack of reading readiness in Johnson's report. Children with foreign-language handicaps often suffer a cultural deprivation as well. The two factors are difficult to separate. A number of reading readiness programs, however, have been directed specifically at the needs of children who lived in communities or districts where a foreign language was regularly spoken in the home. Not infrequently, these children must be taught in the schools to speak the English language. This problem is a common one in sections of the Southwest where many Spanish-American children are enrolled in the public schools. The rate of school failure among such groups is invariably high. The San Jose Public Schools once set out to combat this problem by providing a special program of English-language training in the kindergarten. Fuller (111) has described the operation of the program, and her report shows that a year of such training rather materially reduced the number of failures among Spanish-American children in the low first grade. The failure rate was still 37 per cent, but it was 58 per cent among a comparable group of children who had not had the benefit of the special language program. In another study of essentially the same problem, Herr (158) obtained results which were considerably more impressive. The subjects of Herr's experiment were two equated groups of five-year-old Spanish-American children selected from nine different towns in New Mexico. Intelligence, as measured by the Pintner-Cunningham Primary Intelligence Test, vocabulary ability, and home background were the chief variables used to equate the groups. The control group attended school not at all and received no special training. The experimental group attended school and spent a year on a pre-first-grade reading readiness curriculum, which concentrated on social and emotional adjustment, group cooperation and social play, physical fitness and control, vocabulary building, auditory and visual perception and discrimination, and memory training. Tests given at the end of the year indicated that the

experimental group had reaped a large harvest from this program. Retest findings on an alternate form of the Pintner-Cunningham Test showed an average gain of 29.91 points for the experimental group, as compared with an average gain of only 9.56 points for the control group. On the Metropolitan Reading Readiness Test, also administered at the end of the year, the average scores were 52.0 and 7.39 for the former and latter, respectively. At the end of another year, after the children had attended the first grade, they were given the Metropolitan Reading Achievement Test. On this test, 82 per cent of the experimental subjects equaled or exceeded a grade level of one grade and nine months; 83 per cent of the control subjects remained at or below a grade level of one grade and three months. The average scores were 46.32 for the experimental group and 16.24 for the control group. This is the one study which testifies most strongly to the value of reading readiness activity.

From the evidence as a whole, we can say that reading readiness training is likely to be of most value in the case of children who come from poor backgrounds and who have language handicaps, that is, the best prospects for such training, and incidentally for remedial reading, are children who have suffered a cultural deprivation and who have not had the stimulation of a good home and responsive parents. It is unlikely that such training will be of much value in the case of children who are slow to read mainly by virtue of their immaturity. These children can be just as baffled by the exercises in reading readiness books as by the signs on the pages of primers and preprimers. Endeavors at establishing reading readiness in such cases can come to no good, which is to say that there is no more sense in pressing the matter of reading readiness than the process of reading itself. The two cannot be separated, and a certain level of maturity is a condition for both.

GROWTH IN READING VERSUS LEARNING TO READ

Discussions of reading in terms of the organismic hypothesis too often create the impression that it is *all* a matter of growth

or maturation. It should again be emphasized that two concepts are always involved—maturation and learning. The question of which is more important comes up perennially. It is the nature-nurture or heredity-environment controversy all over again, in a somewhat different setting. The eminent zoologist, G. H. Parker (253), would settle the issue by attributing 90 per cent of a person's total make-up to natural growth, and only 10 per cent to acquired factors or learning. The folly of any such conjecture, as applied to reading, is indicated by the fact that if the share attributed to learning were only one-tenth of 1 per cent, it would still spell the difference between reading and not reading at all. For in the final analysis, a person *learns* to read; he does not "grow" to read as he may later grow a mustache. If reading were entirely a matter of growth, we would not have the amount of illiteracy that exists in the world today. The average illiterate is mature enough; what he has lacked is the opportunity to learn. We might as well assert that the illiterate could grow a thousand times and not learn to read. Learning cannot explain all development; neither can growth or maturation explain the contributions which learning makes to the emergence of new behavior. Reading is definitely an acquired or learned response.

As an aspect of the same problem, the question has even been raised as to whether pupils do not learn better when left altogether to their own devices than when they are guided in their efforts by the teacher. The doctrinaires of this viewpoint would leave out not only the directing of pupils and the assigning of exercises but even guidance, and they would wait on the natural maturing of the wants and interests of children. The teacher, in effect, would become a mere attendant. As Woody effectively states the case:

Many enthusiasts for building the curriculum on children's interests and needs seem to be working on the assumption that these needs and interests have developed through the internal maturation of the child *per se,* without being affected to any great extent, if at all, by the external forces of the environment or culture. The trained protagonist for the child-centered school, in his desire to divert the attention of teachers from *subjects* and *subject matter* to the *learner,* is probably

aware of the part played by culture in the act of learning, but in his enthusiasm for the "child-centered" school he causes the inexperienced, the immature, and the untrained to feel that all the incentives for learning spring from the internal workings of the learner. These converts seem to have the idea that all children's interests, needs, and maturings are innate and develop apart from the pressures of the surrounding culture (364, p. 115).

Those who take this view have failed to grasp the most elementary conceptions of the learning process. A child does not develop in a vacuum. There is strictly no such thing as natural development *per se*. The student always develops in an environment, and his wants are as much a function of the environment as of the internal condition of the organism. The teacher's task is to make herself an active and positive force in that environment.

As for learning with and without the teacher's guidance, an experiment of Meek (221) furnishes an illuminating answer. The purpose of Meek's research was to evaluate the influence of certain factors on the learning of six words by a group of 71 four-, five-, and six-year-old children of better than average intelligence. Each of the six words was learned in association with five other words resembling it in some respect. Since the experimenter "did no teaching except to point to the word that was to be learned and tell what it said" (221, p. 6), the children were left to their own devices to discover cues which would enable them to discriminate the word to be learned from the associated words. Learning the words in this unguided fashion was not very efficient because after the first practice period the percentages of children who made misrecognitions during the following five practice periods did not significantly decrease. Later in her report Meek furnishes evidence which justifies the belief that if the children had received a small amount of instruction from the experimenter, the percentages of children misrecognizing the words would have been substantially decreased. For in her last chapter she describes how three children who had not been able to learn a specific word after numerous trials were shown by the experimenter those elements in the word which would help them to distinguish it from the five associated

words. Not only did these children swiftly learn to recognize the word, but they also mastered all subsequent words swiftly and with few errors. Meek naturally concluded that there is a "need for teacher help and guidance at specific places in learning" (221, p. 86).

To take another example: errors of reversal, such as confusing the letters "d" and "b" or the words "saw" and "was," constitute a common problem during the early days of learning to read. Reversal errors are more troublesome in some cases than in others, but in any case is there a good reason why we should just wait, as certain educational experts have advised, until "certain general and specific maturations have engendered a condition in which reversals are few?" This puts it almost entirely up to maturation. Reversals involve a failure in orientation. Part of the trouble is that the child does not know the way words go. Discovering the direction of a language is one of the first steps in learning to read. On what *a priori* grounds is the child to know this direction? Although little is usually gained in argument by a *reductio ad absurdum,* are we to assume that there are different sets of "general and specific maturations" for the English-speaking and Hebrew child? It is too much even for maturation to straighten out. Potter (261) found that confusions involving reversible symbols are not reduced by mere exposure to such symbols. The direction of a language is something the child must *learn.* The teacher can and should lend a helping hand. One thing which has been found in studies of the effect of kindergarten experience on first reading is that children who have had kindergarten training make fewer reversal errors than children who have not had kindergarten training (314). This difference can be attributed to the fact that kindergarten teachers are constantly on the alert to emphasize and dramatize the direction of our language. What kindergarten teacher has not used her finger or a pointer to good advantage in that regard? By following the pointer or the teacher's finger, the children soon get the "feel" of left-to-right eye movements and they make fewer reversals as a result.

It cannot be said, of course, that growth or maturation is of no account in the process by which reversals are overcome. The

fact that boys tend to make more reversals in first reading than girls is alone enough to indicate that the level of growth is a factor. It is a factor, however, only as setting the stage for learning; that is, growth is best regarded as a condition for learning. The advantage of waiting on growth is not that it will save us the trouble of teaching the child, but that the learning process may then be brought into play more easily and more readily. It is hard to believe that a passive waiting for the effects of maturation is really ever advocated, even though some educational writings, if taken literally, would seem to bear out that construction. The wise navigator in these educational waters will steer a middle course between growth and learning. It *is* a real advantage, if the child is at or past the level of maturation, to master a skill like reading, but learning must perform the rest. The teacher can help by providing the conditions for good learning. Thus, even in the matter of reversals, if extra care is taken, such that lone "b"s and "d"s are not left around to be confused but are always presented as parts of words, as in "baby" and "door," and until the danger is over, not even "baby" and "daddy" are brought into juxtaposition, and other similar precautions and directions well known to the experienced teacher are followed, a condition will then indeed be engendered "in which reversals are few."

Summary

To return to our opening line: What *is* reading readiness? This question is a source of concern to many parents, especially parents of children who are delayed in learning to read. These parents might well be advised that in most instances there is nothing to worry about. It is perfectly normal for children to differ in the time at which they learn to read. There is no way to get around this natural variation. The children who are delayed are probably too immature to read. They will learn as they gain greater maturity, provided that an adequate amount of nurture is supplied. It is obvious that children come to school from some homes much readier for reading than from others. There is no reason why the school should not in this case con-

tinue the good work, or when, in the case of other children, such development has been lacking, because perchance of the barrenness of the home environment, should not arouse and foster it. Further, about the only way one can tell whether or not a child is ready for a given bit of learning is to provide the opportunity and encouragement, and *then* to await developments.   Specific guidance by the teacher is likely to be of most value after the child has begun to show signs of interest and responsiveness.

Chapter 3

THE EYE MOVEMENTS IN READING

INTRODUCTION

As is well known, in reading the eyes do not move across the line in a continuous sweep. They move rather in a rapid series of stop-and-go movements. The eyes start out at the beginning of the first line, stay there an instant, jump to the next place, stop there briefly, jump again, and so on until the end of the line is reached. The eyes then make the return sweep to the beginning of the next line, at which point a new series of leaps and pauses is initiated. The words are grasped only during the pauses of the eyes. There is no useful vision during eye movement itself, the movements from one point in the line to the next being far too rapid to permit the individual to see anything clearly enough to read. You can demonstrate this last fact to yourself very nicely the next time you have occasion to look in a mirror. With your head held still, move your eyes from left to right between two imaginary points. You will quickly discover that you cannot see your eyes in motion. This experiment plainly demonstrates how little there is to see during eye movement itself. Each time you do catch up with your eyes in the mirror, you will find them staring back at you without so much as a quiver. Only a pause of the eyes will return a clear image.

Much of what is known about the psychology of reading and of learning to read has been discovered through careful studies of the eye movements in reading. This chapter reviews the principal findings of these studies. Such a review will not only throw additional light on the reading process, but it will also serve to round out the discussion so far, inasmuch as a con-

siderable part of the eye-movement evidence is related to the problem of growth in reading.

METHODS OF OBSERVING AND RECORDING EYE MOVEMENTS IN READING

The first person to publish a description of the eye movements in reading was the French oculist, Javal (184). In an article published in 1879, he explained how the eyes in reading moved "par saccades" (in jerks). The eye movements in reading have since been called *saccadic* eye movements. This term distinguishes the stop-and-go type of eye movements from other types, such as pursuit movements, which are the kind used in following moving objects, to wit, a pretty girl walking down the road.

Methods of Direct Observation.—Javal made his observations simply by watching the eyes of someone reading. A refinement of this technique is the Miles (228) "peephole method." In this method, a small hole is first punched in the center of a page of reading material. The page is then held before the reader's eyes at a distance of fourteen inches or so. With his eye placed at the peephole, the observer peers through the hole and watches the reader's eyes as he reads the material on the front side of the page. The material should preferably be read aloud. Being a slower process than silent reading, oral reading puts a brake on the eye movements and gives the observer a better opportunity to watch the eyes in action.

One student objected to the peephole method on the ground that it would be disconcerting to try to read with an eerie eye staring at you through the hole. For those who have this trouble, another method of direct observation which makes use of a mirror is recommended. The mirror is placed beside the book on a table. The reader and observer sit at opposite sides of the table. With the reader facing the light, the observer gets a good view of the reader's eye movements in the mirror.

These direct methods demonstrate the general character of the eye movements in reading, and they are useful as instructional devices, but they do not permit an accurate count of the

number of pauses. Many of the smaller movements are missed by even the most experienced observers (279). More accurate methods are needed for measuring not only the number of pauses but also the location of the pauses, the duration of the pauses, the speed and extent of the interfixation movements, the accuracy of the return sweep, the coordination of the eyes, and so forth.

Photographic Recording of Eye Movements.—To make accurate and objective studies of the eye movements in reading, one can turn to the photographic method of recording. Figure 22 illustrates the principle of eye-movement photography. Light from a source is first directed onto the corneas of the eyes. The corneas, in turn, reflect the light rays outward. The reflected beams are then picked up in the camera lenses and brought to a sharp focus, side by side, about a quarter of an inch apart, on the steadily moving film. Each time the eyes move, the beams of light also move, producing a record of the type shown on the illustration. The conditions which make the photographic method possible may be observed by watching the eyes of someone looking up at a light. Notice the bright spot on each eye. These are the reflections which are photographed on the film. Notice next how the bright spots move each time the eyes move. The reason this movement occurs is that the cornea projects forward from the rest of the eyeball and consequently rotates around an axis which is eccentrically placed. The rays of light, as they strike the film, move about five times as far as the point on the eyes from which they are reflected, making a record which can be studied without further enlargement.

The first eye-movement camera using the corneal-reflection method was invented by Raymond Dodge (84) around 1900. Scores of other cameras employing the same principle have since been built by research workers in laboratories throughout the country. Dodge's original device was the forerunner of them all. Most of this laboratory equipment is extremely bulky and cannot easily be transported from one place to another. The apparatus is often anchored to the floor. Figure 23 presents a view of the camera which Tinker has used in his extensive eye-

movement research at the University of Minnesota. A small, portable camera, known as the Ophthalmograph, which has most of the advantages of the larger contraptions, besides being portable, is now available from the American Optical Company, Southbridge, Massachusetts. A picture of this instrument is shown on Figure 24.

The Interpretation of Eye-Movement Photographs. To interpret eye-movement photographs, one should begin at the top and read down. Figure 14 presents an illustrative record. The
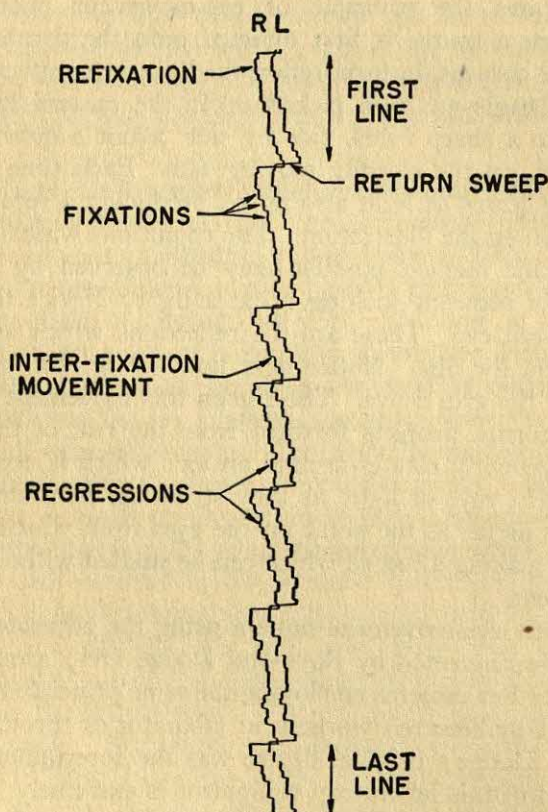
Fig. 14.—Eye-movement photograph of an adult reader showing how the record is interpreted.

short horizontal lines which proceed in a stairlike series from left to right indicate forward shifts of the eyes along the line of print. The extent of each forward movement is measured by the length of the trace. The longer the trace, the greater the jump. The movements are not all progressive. The eyes may move back to retrace ground already covered. These are called "regressive" movements. Regressions show up as backward steps on the record. The vertical lines are produced by the movement of the film while the eyes pause. The length of these vertical lines indicates the duration of the pause. A long pause allows more film to run through the camera than does a short pause. The more the lines lengthen out vertically, therefore, the longer the pause. The long excursion to the left, which occurs at the end of each series of short steps, represents the return sweep to the beginning of the next line. This trace is drawn slightly slantwise by the movement of the film while the return sweep is made. The interfixation movements within the line show a similar lag, but individually they consume less time than the return sweep. In making the return sweep, the eyes often do not move back far enough on the first attempt. One or more additional movements to the left must then be made in order to locate the beginning of the next line. These movements present the appearance of regressions, but usually they are not counted as real regressions. They are included as a part of the return sweep and are called "refixations." Backward movements are called regressions only when they follow a forward movement along the line.

Measures of the Eye Movements in Reading. In working with eye-movement records, it is customary to compute the following more or less standard measures. The first and last lines of the record are usually omitted from these measurements because these lines tend to be read atypically.

1. Average number of fixations per line. This measure is obtained by dividing the total number of pauses by the number of lines. All regressions and refixations are generally included in this score. It is also possible to divide the total number of

words by the number of pauses; this yields a rough measure of the size of the reading or recognition span. The reading span varies inversely with the number of fixations. The fewer the pauses, the wider the span.

2. Average number of regressions per line. This measure is computed by dividing the total number of regressions by the number of lines. Refixations are not included in this measurement. Regressions occur for several reasons. The eyes may bite off more than the mind can chew (6). A regression is then made to cut down on the size of the fixation. Misreadings which do not make sense and which are corrected on a second fixation constitute another cause of regressions (101). Any condition which interferes with the search for meaning is likely to cause a regression (18).

3. Average number of refixations per line. This is a measure of the accuracy of the return sweep. The return sweep may be inaccurate in a number of ways: (a) the eyes may return to the beginning of the line just read; (b) they may skip a line; (c) they may overshoot the beginning of the next line; or (d) they may undershoot the beginning of the next line. Only the last type of inaccurate return sweep is readily detected from eye-movement photographs. This type, which is the most common, is indicated by what we have previously called refixations. The total number of refixations is divided by the number of lines. A score above 1.00 means that more than one refixation has been made on at least one line.

4. Average duration per fixation. This measure requires the use of a timer which interrupts the light at a known rate before it reaches the film. When such a timer is used, the trace appears as a dotted line rather than a solid one. The time of each fixation can be measured by counting the number of dots at each place on the record where the trace stretches out vertically. If the light is interrupted 25 times a second, for example, six dots would equal $\frac{6}{25}$ of a second. The average is obtained by dividing the total fixation time by the whole number of pauses. The Ophthalmograph does not provide the time registration needed to get this measure.

5. Rate of reading. This is a composite measure of eye movements. The total reading time, including the time of the interfixation movements, is first computed in seconds. The number of words in the passage is then divided by the number of seconds in order to obtain the number of words read per second. Multiplying this answer by sixty yields the words read per minute. The Ophthalmograph lends itself to these measurements, inasmuch as the film runs through the camera at a constant rate of one-half inch per second. With the film speed in mind, it is a simple matter to determine the reading time from the film length.

6. Total perception time. This measure is obtained simply by computing the total fixation time from records which permit a measurement of the duration of the individual pauses. It does not include the time taken to make the interfixation movements. As explained earlier, vision is not clear enough to read during eye movement itself. It is not appropriate, therefore, to include interfixation time as a part of total perception time. Research has demonstrated that most of the total reading time is spent in making pauses, and that relatively little time is consumed by the eye movements themselves. The fixations take up about 90 per cent of the total reading time in rapid reading, and about 95 per cent of the total reading time in slow reading (331). In normal reading, we are not aware that vision is interrupted each time an eye movement is made. The movements occur so rapidly that there is not time for the mind to resolve the interruptions which occur between pauses. For all practical purposes, vision is continuous. Studies (70, 293) have shown that interfixation movements within the line average only about 22 ms.[1] The average return sweep, which is a comparatively long movement, takes only about 40 ms. The speed of the interfixation movements cannot be varied at will. The rate is reflexively governed and remains constant for the same individual, except as fatigue sets in or as certain drugs, like alcohol, may have an influence (50).

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[1] *ms.* Millisecond = 0.001 second.

Electrical Recording of Eye Movements.—Although the photographic method remains to this day the most widely used means of recording the eye movements in reading, mention should also be made of an electrical method which has recently come into use in certain kinds of eye-movement research. In the latter method, the small changes in electrical potential which are associated with the movement of the eyes in reading are picked up, amplified, and registered on paper tape by means of an ink-writing device. These records, which are known as electro-oculograms, have the same general appearance as photographic records of the eye movements. In one study in which simultaneous electrical and photographic recordings were made of the eye movements in reading, high correlations were found between the eye-movement scores obtained by the two methods (169). However, after careful consideration of the evidence, Tinker (336) concluded that the corneal-reflection technique is the more satisfactory of the two. Photographic records are more exact and they can be plotted more accurately. The photographic method nevertheless suffers certain limitations. For one thing, the bright light which must be shone on the eyes is irritating to some readers. Then, too, the head must be held in a rigid position by a combination of chin rests, head clamps, and biting boards, in order to prevent head movements. Head movements are the bane of existence of the eye-movement researcher because they confuse the record and often throw the reflected beams off the film. For that reason some method must be used to restrain the head, and all in all, the position which results is not a comfortable one. The Ophthalmograph minimizes much of the usual inconvenience but does not eliminate it entirely. The electrical method is completely free from these distractions. Once the electrodes are in place, the reader may sit back with the book in his hands and read in the usual way. The electrical method is especially useful when continuous records over a long period of time are desired. The photographic method cannot be so readily adapted to studies of prolonged reading. The main hindrance of the electrical method is the high cost of the equipment.

The Reliability and Validity of Measures of Eye Movements in Reading

The scores obtained from eye-movement records are both reliable and valid indicators of reading achievement. The concept of reliability refers to the consistency of measurement. When an adequate amount of material is used for the test before the camera, the various eye-movement measures yield reliability coefficients which compare favorably with most paper-and-pencil tests of reading achievement (12). A minimum of twenty lines of material is recommended for eye-movement measurements when the object is to assess individual performance (334). Half this number of lines is sufficient for group measurements.

The question which the concept of validity poses is whether a test actually measures what it purports to measure. The method which has been employed to investigate the validity of eye-movement scores has been to correlate these scores with results on paper-and-pencil tests of reading achievement. High correlations are the rule when care is taken to provide material in the camera situation which is comparable to that used in the criterion (333).

It has often been argued that a normal reading performance cannot be obtained in the camera situation because of the artificial conditions imposed on the reader. This objection is adequately answered by the work of Gilbert and Gilbert (131). Their subjects were 47 fifth-grade youngsters who read one form of the Iowa Silent Reading Test before the camera and another form away from the camera. No significant differences were found in test performance between the two situations. On the average, the pupils read just as rapidly and with as good comprehension before the camera as when away from it. In general there was little choice between the situations so far as the pupils were concerned. A few complained of the bright lights and head clamps. Almost as many preferred the camera because it was "more fun." In any case, comparable reading performances were obtained in the two situations, which is the main thing. A similar study was made by Tinker (333), in which 57 college students read different forms of the Chapman-

Cook Speed of Reading Test before the camera and when away from it. According to Tinker, the group came through with an entirely typical performance in the photographic situation.

It should be noted in passing that most tests before the camera involve a comprehension check. After the photograph is made, the subject may be asked to state the substance of what he has read, or he may be given a short objective test over the material. True-false questions are often used to check comprehension. The object of these tests is to make sure that the subject actually reads the material and does not beat the game by merely going through the motions of reading. Fixation and regression frequency and pause duration increase when the subject knows that he is going to be held responsible for the content (346).

GROWTH IN MEASURES OF THE EYE MOVEMENTS IN READING

The results reviewed above indicate that the eye-movement technique can be used with confidence to study reading performance. Eye-movement records permit a type of analysis of the reading process which is not possible by other methods. While Dodge must be given credit for originating the photographic method of eye-movement recording, he was not the first to use the method in a detailed study of the eye movements in reading. Dodge was mainly interested in perfecting the technique, and his early work with the camera was largely directed at other types of eye movement. He gave a student of his, one of the present writers, the opportunity to make the first series of photographic records of the eye movements in reading (70). In the years which have followed, the literature on eye movements in reading has grown enormously. Included in this literature are several studies on the problem of growth in measures of the eye movements in reading. These studies will now be reviewed as a part of the general question of growth in reading.

Perhaps the best known study of growth in eye-movement behavior is that of Buswell (46), who photographed the eye movements in silent reading of 186 subjects, representing all grades from the first to the college level. For the most part

these subjects were average readers. There were between eight and nineteen cases in each grade group. With the exception of the first-grade pupils, all subjects read the same passage before the camera. The use of the same passage was designed to control whatever effect variations in the difficulty of material might have on eye movements. An exception had to be made in the case of the first-grade youngsters, who needed an easier passage in order to take part in the experiment at all. The length of line used in printing the passages was 3.5 inches. Table VIII

TABLE VIII

AGE CHANGES IN MEASURES OF THE EYE MOVEMENTS IN SILENT READING

School Grade	Average Number of Fixations Per Line	Average Number of Regressions Per Line	Average Duration Per Fixation
IB	18.6	5.1	660 ms
IA	15.5	4.0	432
II	10.7	2.3	364
III	8.9	1.8	316
IV	7.3	1.4	268
V	6.9	1.3	252
VI	7.3	1.6	236
VII	6.8	1.5	240
High School I	7.2	1.0	244
High School II	5.8	0.7	248
High School III.....	5.5	0.7	224
High School IV	6.4	0.7	248
College	5.9	0.5	252

Adapted from Buswell (46).

summarizes the median group results for the three principal measures of eye movements. The same data are portrayed graphically on Figures 15a, b, c. The curves show that the first four grades constitute the major period of development. After the fourth grade, the curves level off rapidly. The curves continue to show some change to the fifth grade, but at a diminishing rate. The turning point seems to be the fourth grade. Buswell's findings have been widely interpreted to mean that eye-movement habits become fixed, more or less for keeps, by the end of the fourth grade. To use Tinker's words: "It would
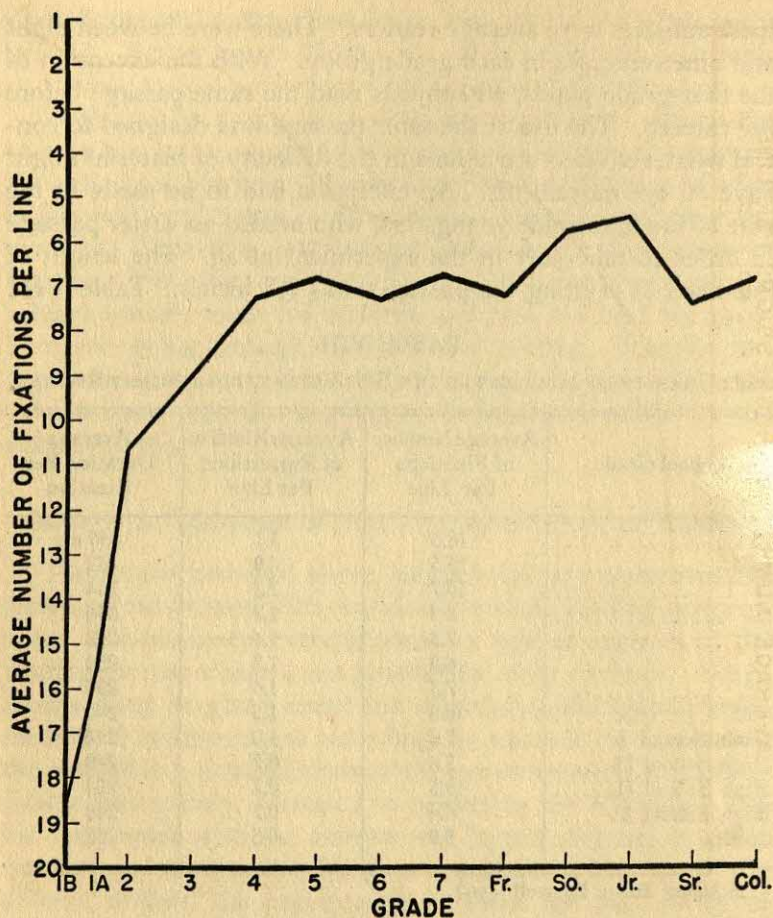
FIG. 15a.—Buswell's growth curve for fixation frequency.

appear that eye-movement habits in silent reading have become fairly stable by the end of the fourth grade" (332, p. 251). Such statements discount the secondary spurt which Buswell's curves for fixation and regression frequency show around the age of entrance to high school, but more will be said about that later. The curve for pause duration shows no important change after the initial surge. Growth in this measure apparently calls it quits for good no later than the sixth grade.
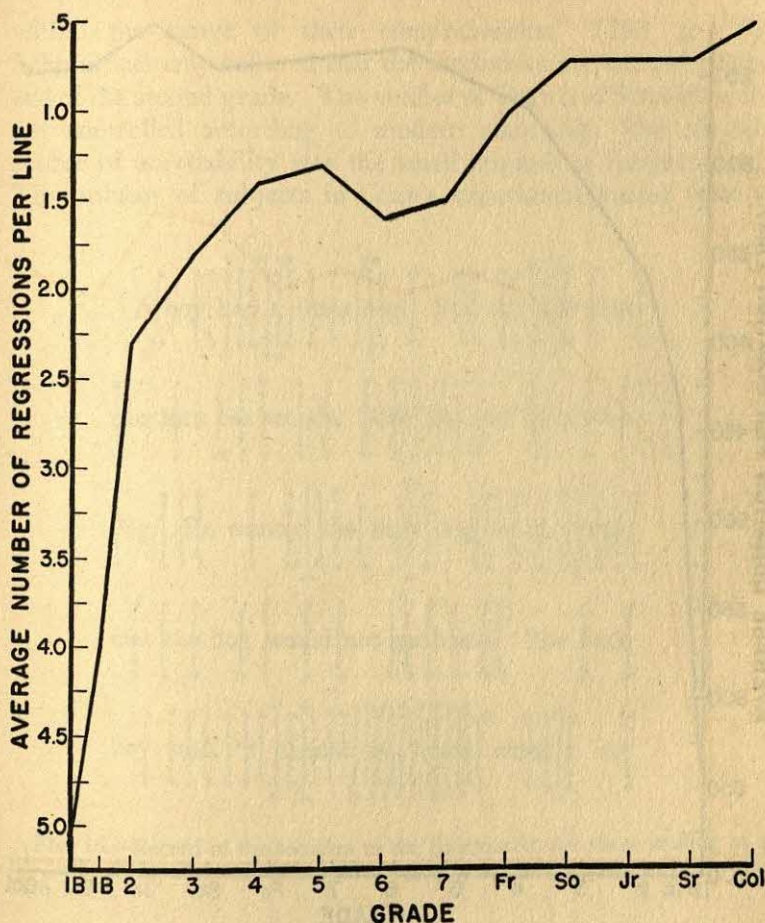
Fig. 15b.—Buswell's growth curve for regression frequency.

Other studies of age changes in eye-movement scores have been made by Gray (138) and Schmidt (293). Their results, too, show that growth in these measures levels off rather early during the school years. Gray's findings indicate that significant growth in fixation and regression frequency and pause duration cannot be expected beyond the sixth grade. Schmidt found that elementary, high school, and adult subjects read
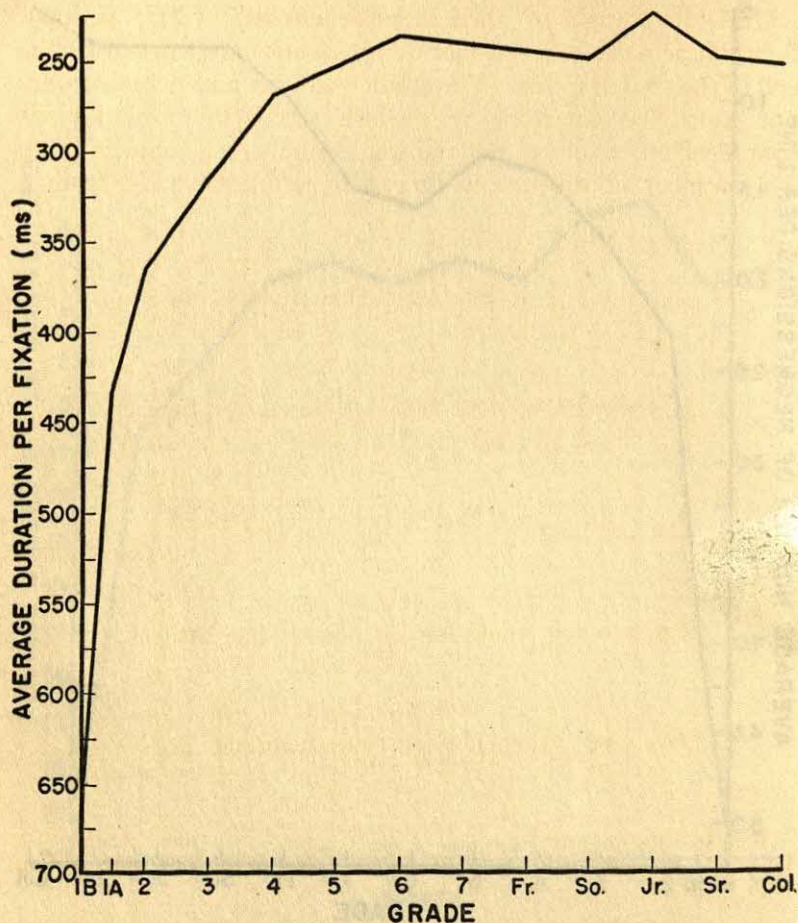
Fig. 15c.—Buswell's growth curve for pause duration. From Buswell (46, pp. 27, 32, 35), by permission of the University of Chicago Press.

with about the same fixation frequency. Referring to this finding, Schmidt stated: "It shows very clearly that individuals, after having once mastered the technique of reading, tend on the average to require about the same number of pauses in reading a given length of line quite irrespective of age and accomplishment, provided, of course, that the reading material falls

within the range of their comprehension" (293, p. 66). Schmidt actually believed that the mechanics are learned by the end of the second grade. The studies of Gray and Schmidt were not controlled according to modern standards. One serious source of unreliability was the small number of subjects used. The number of subjects in Gray's experiment varied from a
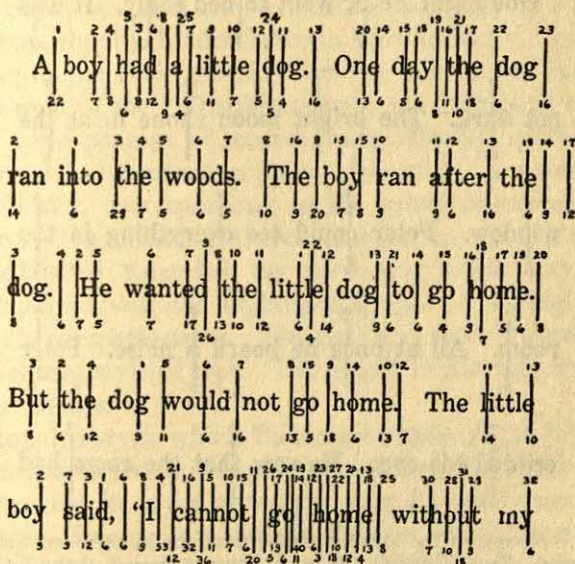
Fig. 16.—Record of the location of the fixations in the silent reading of a IA pupil. From Buswell (46, p. 2), by permission of the University of Chicago Press.

low of six in Grade IV to a high of nine in Grade VII. Schmidt worked with even smaller numbers. His groups varied in size from two subjects in Grade II to six subjects in Grade VI. The use of such small numbers can lead to large sampling errors.

Figures 16 and 17 illustrate another method of representing the change in eye-movement behavior which occurs with time. The technique which is employed to construct such records is as follows: Before reading the paragraph, the subject fixates alternately on two dots which are placed squarely in line with the left and right margins of the material. The film is then

projected on the paragraph, and the traces left by these pre-
liminary fixations are used as reference points to true the record
to the left and right margins of the text. The fixations are
located by threading the film through the projector and marking
the points at which the fixations within each line of the record

One night Peter went to bed early. It was

not dark. The bright moon shone in at the

window. Peter could see everything in the

room. All at once he heard a noise. Peter

opened his eyes. He saw that the room had
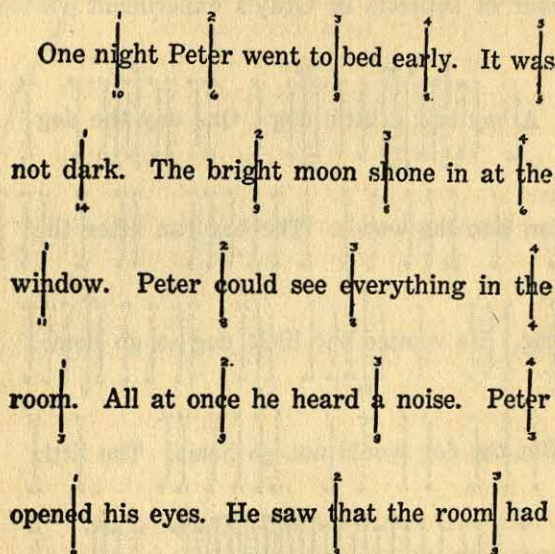
FIG. 17.—Record of the location of the fixations in the silent reading of a
college senior. From Buswell (46, p. 3), by permission of the University of
Chicago Press.

cross the corresponding line of print on the page. The vertical
lines shown on the records of Figures 16 and 17 indicate the
location of the pauses. The numbers at the top of the vertical
lines signify the order of the pauses across each line of print.
The numbers at the bottom denote the time of the fixations in
twenty-fifths of a second. This technique has often been em-
ployed to identify vocabulary difficulties and other sources of
confusion in reading.

To turn now to a question regarding Buswell's use of a
common passage in all grades above the first. This standard
passage had to be easy enough for the second-grade children to
read, which means that it must have been very easy for some of

the older age groups. The failure of Buswell's results to show marked growth beyond the fourth grade might be explained on the ground that the standard passage did not provide enough "ceiling" to discriminate at the upper levels. How would the results turn out if graded passages were used with each grade? An attempt to answer this question has recently been made by Ballantine (17). His subjects were selected from grades two, four, six, eight, ten, and twelve. There were twenty children in each group, equally divided between boys and girls. All were average pupils for their grade. The eye movements in silent reading of each of the 120 subjects were photographed on two selections, one a passage of second-grade difficulty, corresponding to Buswell's standard passage, the other, a passage of graded difficulty, corresponding to the grade classification of the children. The difficulty of the passages was determined by various published formulas for predicting readability. The camera employed was the Ophthalmograph. A careful check was kept on comprehension. The passages were printed in a uniform size and style of type. The length of line was approximately four inches.

The growth curves which Ballantine obtained for his three principal measures are shown on Figures 18a, b, c. These curves were constructed from the group averages for each measure on each passage. The em was used as the unit of measurement, a practice which Walker (350) introduced into eye-movement research. As every crossword puzzle fan knows, the em is a printer's measure (defined as the width of the capital M of the size of type used). For a given font, the em represents a fixed traveling distance along the line. Measurements based on ems, therefore, put comparisons between passages on an equal footing. Measurements founded on words often yield misleading results because, as the difficulty of material increases, the word length also tends to increase. Under these conditions, the average size of fixations may decrease with increased difficulty of material, simply because there are fewer words per line in the more difficult material to divide by the number of fixations. The use of the em provides a control over this source of error.

Surprisingly or not, Ballantine did not find much difference
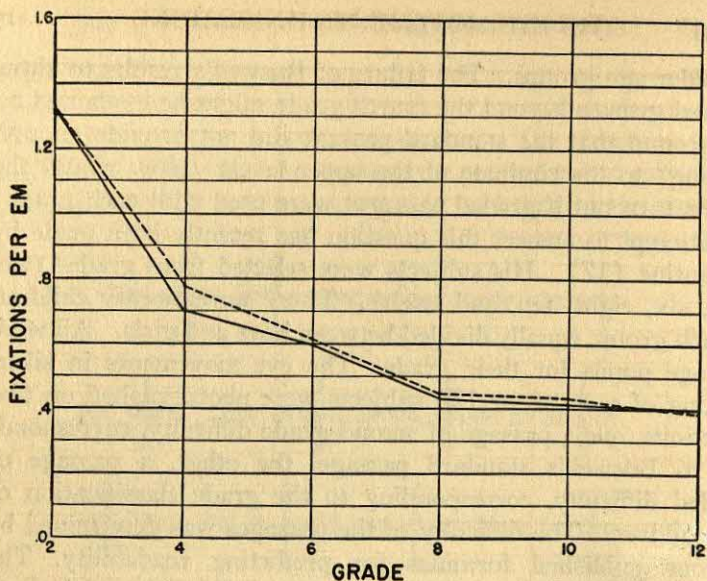
Fig. 18a.—Ballantine's growth curves for fixation frequency (solid line, easy passage; broken line, graded passage).
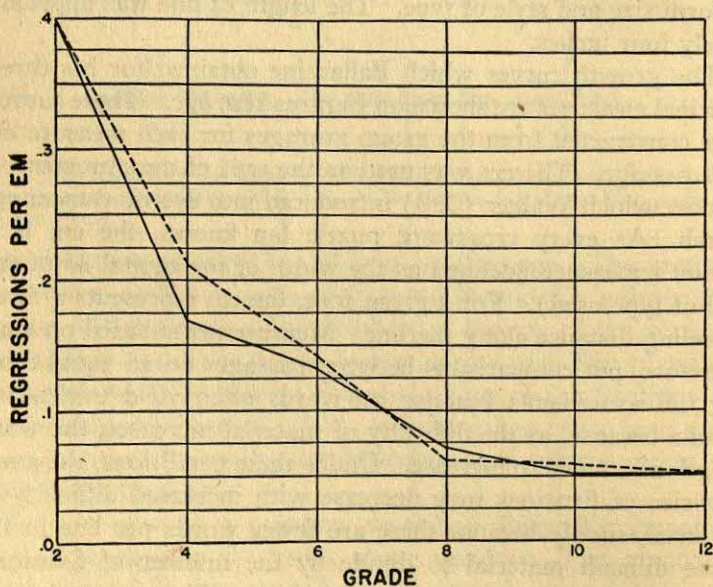
Fig. 18b.—Ballantine's growth curves for regression frequency (solid line, easy passage; broken line, graded passage).
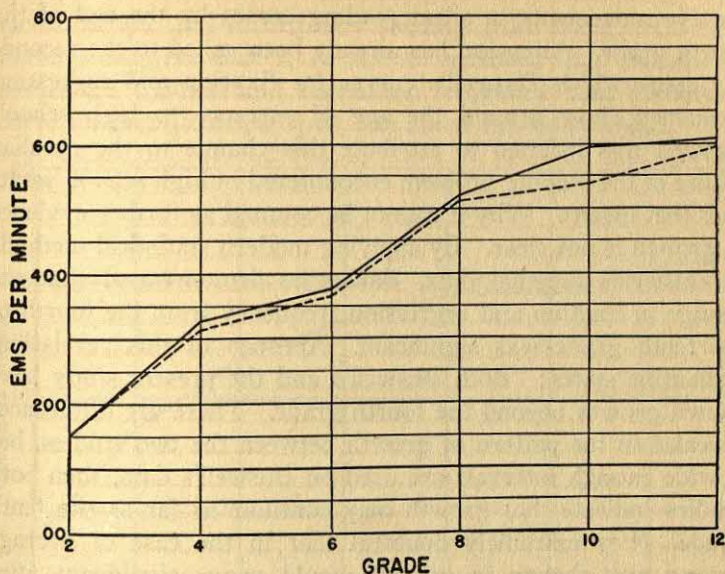
FIG. 18c.—Ballantine's growth curves for rate of reading (solid line, easy passage; broken line, graded passage). From Ballantine (17, pp. 88, 90), by permission of the University of Michigan Press.

between the results for the easy and graded passages.[2] For each measure, the two curves follow remarkably similar paths and show little difference either as to rate or pattern of growth. On the whole, the easy passage was perhaps read slightly more efficiently than the graded passages, but on no measure were significant differences found between the passage averages within grade levels. These results do show a longer period of growth than Buswell's results are usually given credit for. This is true of all measures on both paragraphs. The curves for fixation and regression frequency do not level off until the eighth grade. Growth in rate of reading seems to continue for an even longer period. On this measure, a plateau is not reached until the tenth grade.

Ballantine's results may require a modification of the generalization based on Buswell's findings that growth in measures of

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[2] Evidence which is presented later in the chapter will help to explain this failure to find differences in the curves for the easy and graded passages.

the eye movements in silent reading ceases by the end of the
fourth grade. Attention has already been called to the second-
ary spurt which Buswell's curves for fixation and regression
frequency show around the age of entrance to high school.
Buswell was inclined to attribute this change to the peculiar
nature of the reading problem encountered in high school, what-
ever that means. Why it cannot be counted as further evidence
of growth is not clear. By applying modern statistical methods
to Buswell's original data, Ballantine demonstrated that the
change in fixation and regression frequency from the fourth to
the tenth grade was significant. Apropos of this revelation,
Ballantine states: "Both Buswell's and the present study have
shown growth beyond the fourth grade. There are differences
revealed in the pattern of growth between the two studies, but
if wide enough intervals are used on Buswell's data, then both
studies indicate that growth may continue as far as the tenth
grade. It is extremely doubtful that in the case of average
groups any change in growth would prove significant after
Grade X" (17, pp. 105-6).

The fourth grade seems a bit early as a stopping point, espe-
cially as growth in certain other measures which are related to
the eye movements in reading continues for a longer period.
The growth curve for one such measure is shown on Figure 19.
This graph is based on data reported by Hoffman (170). Fa-
miliar words were exposed for a fraction of a second in a
tachistoscope or short-exposure apparatus. The curve shows
how the average span in units of a letter increases with advance
in school grade. Growth is apparent at least until the seventh
grade. While not a measure of the eye movements proper,
tachistoscopic span is nevertheless related to the eye-movement
functions. Litterer (209) obtained a correlation of .46, and
Robinson (278) one of .52, between the size of the fixations in
normal reading and the span of perception in a tachistoscope.
The more the presentation of material in a tachistoscope ap-
proximates the processes of normal reading, the closer the
relationship becomes. By using a more realistic method of
presenting material in a tachistoscope, Robinson was able to
raise the correlation between the spans of recognition in

tachistoscopic and in ordinary reading from .52 to .66. Such findings suggest that it is not an accident that Ballantine's curves for fixation and regression frequency, and Hoffman's curve for tachistoscopic span, run about the same course.
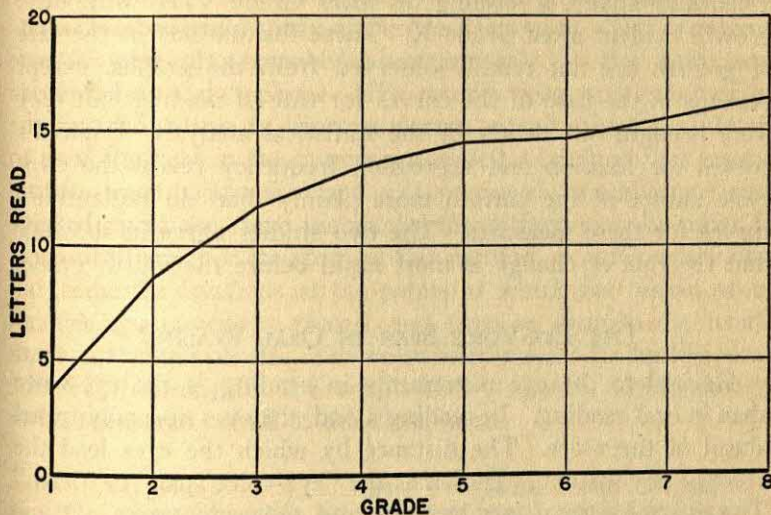
Fig. 19.—Increase in tachistoscopic span for familiar words, with advance in school grade.

As noted before, Buswell's curves for fixation and regression frequency reveal two spurt periods. It is of interest to point out that the lesser of these spurts occurs at about the age at which adolescence takes hold of youngsters. It is possible that this change in the curves is related to the adolescent spurt. Rather significantly, Ballantine found a similar two-cycle variation in rate of growth. Speaking of this phase of his study, Ballantine reports: "The differences between the means for fixation and regression frequency and rate of reading were significant at the 1 per cent level between Grades II and IV and Grades VI and VIII, on both passages. In addition, a significant difference at the 5 per cent level was found for rate of reading between Grades VIII and XII on the graded passages. Significant differences were not proved for either passage between Grades IV and VI or between Grades X and

XII for any of the above-mentioned measures" (17, p. 110).
In other words, the results revealed a period of rapid growth
between Grades II and IV, a deceleration of growth between
Grades IV and VI, a reacceleration between Grades VI and
VIII, and finally, a leveling off after Grade VIII, with little
growth evident after Grade X. These fluctuations in the rate
of growth are not readily observed from the graphs, except
perhaps in the case of the curves for rate of reading, but they
were brought out clearly by the statistical analysis. Buswell's
curves for fixation and regression frequency reveal the two-
cycle nature of the pattern more plainly than do Ballantine's
curves for these measures. The two studies agree in showing
that the rate of change is most rapid before the fourth grade.

The Eye-Voice Span in Oral Reading

Related to the eye movements in reading is the eye-voice
span in oral reading. In reading aloud, the eyes normally travel
ahead of the voice. The distance by which the eyes lead the
voice at any instant is known as the "eye-voice span" or "lead."
The eye-voice span can be measured either in terms of time
or space. The space lead can be expressed in terms of words,
ems, letter spaces, millimeters, or some other convenient unit.
The time span is the difference in time which occurs between the
fixation of the eyes on a word and the pronunciation of the same
word by the voice. (Much like the eye-voice span in oral read-
ing are the eye-hand span in typewriting and in playing a piano
from a score, and the ear-hand span in telegraphy.)

Methods of Measuring the Eye-Voice Span.—A rough
measure of the space lead may be obtained by slipping a card
over a paragraph which the subject is reading orally. The num-
ber of words which he is able to read after the view has been cut
off is a measure of his eye-voice span. This operation should
be repeated on different parts of the page to strike an average.
Similar results may be secured by extinguishing the source of
light, the game in this case being to see how many words the
subject can read after the lights have been turned off. A refine-
ment of the latter method is to project a paragraph on a screen.

The view may then be cut off simply by covering the lens of the projector with a card. Measurements along this line were first made by Quantz (267), who found an average eye-voice span of 5.4 words for one adult subject.

Gray (138) later developed a technique which made possible a much more exact study of the eye-voice span. The eye movements were photographed simultaneously as the voice was recorded on a dictaphone. The records were synchronized by closing from time to time an electric circuit which (1) interrupted the light in the camera and so left a break at that instant in the trace on the film and (2) produced an auditory signal picked up at the same instant by the dictaphone. In order to measure the eye-voice span by this method, it is necessary first to locate the fixations at the points at which the breaks occur in the eye-movement record, and then to identify the words spoken at those points. The voice fixations can be readily identified by listening for the word which is spoken simultaneously with the signal sound in the dictaphone.
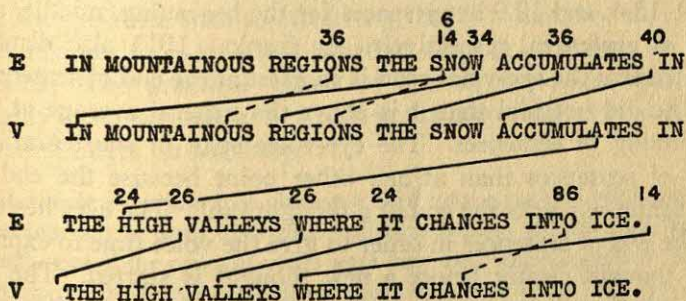
FIG. 20.—Location of the voice with reference to the eyes in oral reading. From Tiffin and Fairbanks (328, p. 76), by permission of Psychological Monographs and the American Psychological Association.

A further improvement in method has been described by Tiffin (327) and by Tiffin and Fairbanks (328), who installed a sound-wave recorder in the Ophthalmograph which made it possible to register the eye movements and sound waves from the voice simultaneously on the same film. Figure 26 shows a typical record. The words are matched with the sound waves from a phonograph record cut simultaneously with the other

records. The head-line calls for the addition of an extra lens
to the camera which is used to photograph a beam of light
reflected from a bead attached to a pair of spectacle frames worn
by the subject. When a timer is used to interrupt this beam
at a known rate, a record is obtained which can be used both to
check on head movements and to measure time. Figure 20
presents a sample of the final product of these measurements.
The diagonal lines connect the eye fixations with the voice fixa-
tions at simultaneous points in time. Points of regression are
referred to the voice by dotted lines. The numbers indicate
the duration of the fixations in hundredths of a second. Buswell
(47) has published a number of similar records based on the
same technique.

Characteristics of the Eye-Voice Span.—As the above rec-
ord illustrates, the eye-voice span varies in size from point to
point in the paragraph. Buswell (45) found that it is longest at
the beginning and shortest at the end of sentences. On the basis
of measurements of 54 subjects, he reported average spans of
15.9, 13.4, and 10.9 letter spaces for the beginning, middle, and
end of sentences, respectively. Fairbanks (101) also demon-
strated that the eye-voice span is shortest at the end of sentences,
but he did not find that it is above the general average at the
beginning of sentences. The eye-voice span in shorter at the
end of sentences than at any other point because the end of
the sentence marks the end of a thought unit. The eyes hesitate
at the end of sentences in order to give the voice time to express
one thought clearly before a new thought is started. The net
result is that the separation between the eyes and voice decreases
at that point. Buswell revealed that this effect is more pro-
nounced in the eye-voice records of good readers than of poor
readers. This finding is related to the fact that poor readers
pay less attention to the thought of the sentence than do good
readers. The poor reader tends to read words one by one as he
encounters them, often without regard to punctuation. In that
case the reader may pass from sentence to sentence without a
marked change in the eye-voice span.

The principal source of the intrapassage variation in the size
of the eye-voice span concerns the readability of the material

itself. The span is at its widest when the material reads smoothly. It is reduced in size by the presence of difficult or ambiguous words and by the appearance of other sources of uncertainty and confusion. The eyes hesitate until the meaning is clear, which gives the voice a chance to catch up with the eyes. Regressions operate to reduce the separation between the eyes and the voice. The eye-voice span varies with the individual. Good readers have a wider and more elastic span than poor readers. Changes occur with age, as we shall discover in the next section.

Values of the Eye-Voice Span.—Anyone who has observed a skillful oral reader in action will appreciate the value of a wide eye-voice span. The lecturer reading from manuscript does not keep his eyes glued to the page. He looks up at his audience from time to time to keep in rapport with his listeners. The flow of speech continues without interruption. The speaker keeps talking from the view which he already has of the words ahead. He makes use of the eye-voice span. Some oral readers use the eye-voice span so effectively that it is hard to tell, unless the manuscript is in view, whether they are reading or just talking. The practical values of a wide eye-voice span are readily demonstrated, as revealed in the following account which Buswell offers on the subject:

A simple experiment of placing a card over a printed page and uncovering only a word at a time will demonstrate the situation which would exist if the eye and voice were kept very close together. Interpretation of the passage is difficult under such conditions. An eye-voice span of considerable width is therefore necessary in order that the reader may have an intelligent grasp of the material read, and that they may read it with good expression. If words are encountered which are spelled alike but pronounced differently, such as "read" (present tense) and "read" (past tense), the correct pronunciation and meaning cannot be determined in many cases until the eye has observed the context by looking ahead. A still further need for a wide eye-voice span is apparent when marks of pronunciation are encountered. This need is well illustrated by the reading of children when they arrive at a question mark without having seen it in advance, and find their vocal expression entirely unprepared for it. Their failure to respond with a rising inflec-

tion of the voice is clear evidence that they were not looking ahead and that they were not getting the thought in large units (45, p. 1).

Buswell (45, p. 87) asks us to read the following passage which he has constructed:

> The boys' arrows were nearly gone so they sat down on the grass and stopped hunting. Over at the edge of the woods they saw Henry making a bow to a little girl who was coming down the road. She had tears in her dress and also tears in her eyes. She gave Henry a note which he brought over to the group of young hunters. Read to the boys it caused great excitement. After a minute but rapid examination of their weapons, they ran down the valley. Does were standing at the edge of the lake making an excellent target.

This paragraph contains six ambiguous words: "bow" in line three, "tears" in line four, "tears" again in line four, "read" in line six, "minute" in line seven, and "does" in line eight. In an experiment in which this paragraph was used to obtain eye-voice records, Buswell found that subjects who had a wide eye-voice span had less difficulty with these words than subjects who had a narrow eye-voice lead. The latter often assigned the wrong pronunciation to the test words because they were not looking far enough ahead to grasp the meaning of these words in context. The eye-movement records of these subjects clearly revealed the confusion which occurred at those points in the paragraph. Regressions frequently had to be made before the correct meaning of the word could be recognized. Did you trip over any of the test words?

In another report, Buswell (47) describes a method which he has used successfully with junior-high pupils to enlarge the eye-voice span. In this method, stereopticon slides are used to project passages on a screen. The class reads the material orally. From time to time the projector is unexpectedly turned off and the pupils are encouraged to read ahead as far as they can. The number of words which they are able to read after the view is shut off reveals the size of their eye-voice span and also enables them to keep a record of their progress. Buswell reports that pupils enjoy this practice and that they enter into

it with enthusiasm. Here is a simple home remedy. Find
something to read orally. As you read, look up from the page
now and then, reading ahead each time as far as you can. It
may help to have someone tap on a table as a signal for you to
lift your eyes from the page.

GROWTH IN THE EYE-VOICE SPAN

Figure 21 presents in graphical form the results of a study
which Buswell (45) has made of growth in the eye-voice span.
Simultaneous eye-voice records were obtained by the method
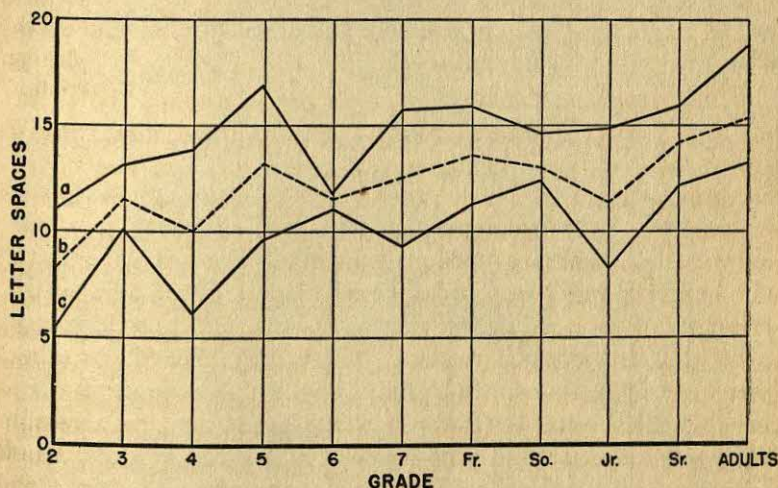
FIG. 21.—Increase of the eye-voice span with advance in school grade
(*a,* good readers, *c,* poor readers, *b,* both good and poor readers). From
Buswell (45, p. 40), by permission of the University of Chicago Press.

which Gray (138) originated. The subjects included two good
and two poor readers from each elementary grade two through
seven, three good and three poor readers from each of the four
high-school classes, and six college students. The college sub-
jects were selected at random, but they were divided into two
groups of three, one better than the other. Two passages were
employed, one an easy passage which was used throughout the
elementary grades, the other a harder selection which all of the

older subjects read in common. The curves shown on Figure 21 trace the course of development of the average eye-voice span both for all the subjects in each grade and for the good and poor readers separately. The upper line gives the results for the good readers, the lower line those for the poor readers. The line in the middle represents the combined results. The irregularities in these curves can be attributed to sampling errors. The fact that so few subjects were used in each grade is a limitation of the study. Certain trends are nevertheless apparent. The good readers have a wider eye-voice span than the poor readers at all levels. All three curves show gradual growth over the entire range. The fluctuations which appear in the graphs can be discounted. If the curves were smoothed, they would show a gradual rise to the adult level.

INDIVIDUAL DIFFERENCES IN MEASURES OF THE EYE MOVEMENTS IN READING

Studies of the eye movements in reading have repeatedly shown that there are wide individual differences within any age or grade in all measures. Good readers at any level make fewer fixations per line, fewer regressions, and take less time per fixation than poor readers. These differences have to be seen to be appreciated. In a study in which a group of seventh-grade pupils were tested on seventh-grade material, Morse (235) found one child who made 8.01 fixations per line and another child who made 27.82 fixations per line. In the same study was a youngster who made .026 regressions per line, another who made 8.01 regressions per line. In other words, there were children in the group who made as many regressions per line as others made fixations per line. The records exhibited on Figure 27 illustrate these differences for four of Morse's cases. An examination of these records will reveal that the first case read eight lines in less than half the time required by the last case to read four lines. The one read more than four times as rapidly as the other.

Figure 25 presents the distribution of the rate of reading scores which Ballantine obtained on the easy passage for the

As the film moves vertically through the camera and the reader's eyes move horizontally across the page from left to right the eye fixations are recorded as vertical marks forming a double "stairway." An analysis of the reading graph gives the words read per minute, the span of recognition, the number of fixations and regressions. It furthermore shows any deviation from perfect coördination of the two eyes during reading.

FIG. 22.—The corneal-reflection method of photographing the eye movements in reading. Courtesy of the American Optical Co.
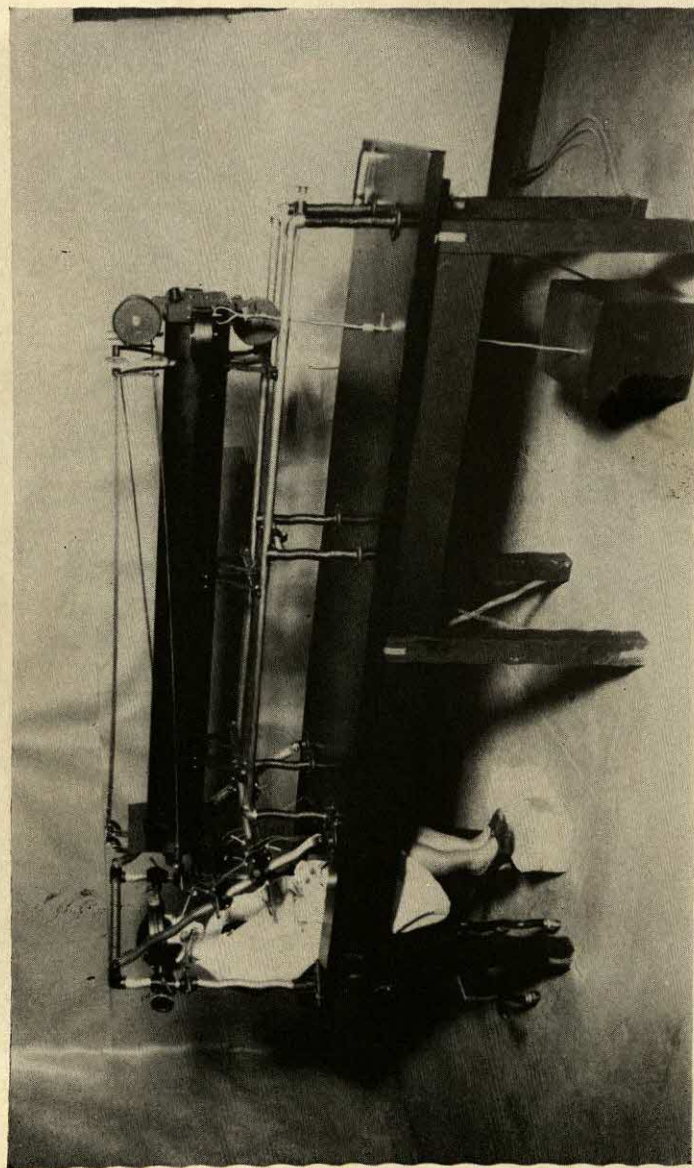
Fig. 23.—The University of Minnesota eye-movement camera. Courtesy of Miles A. Tinker.
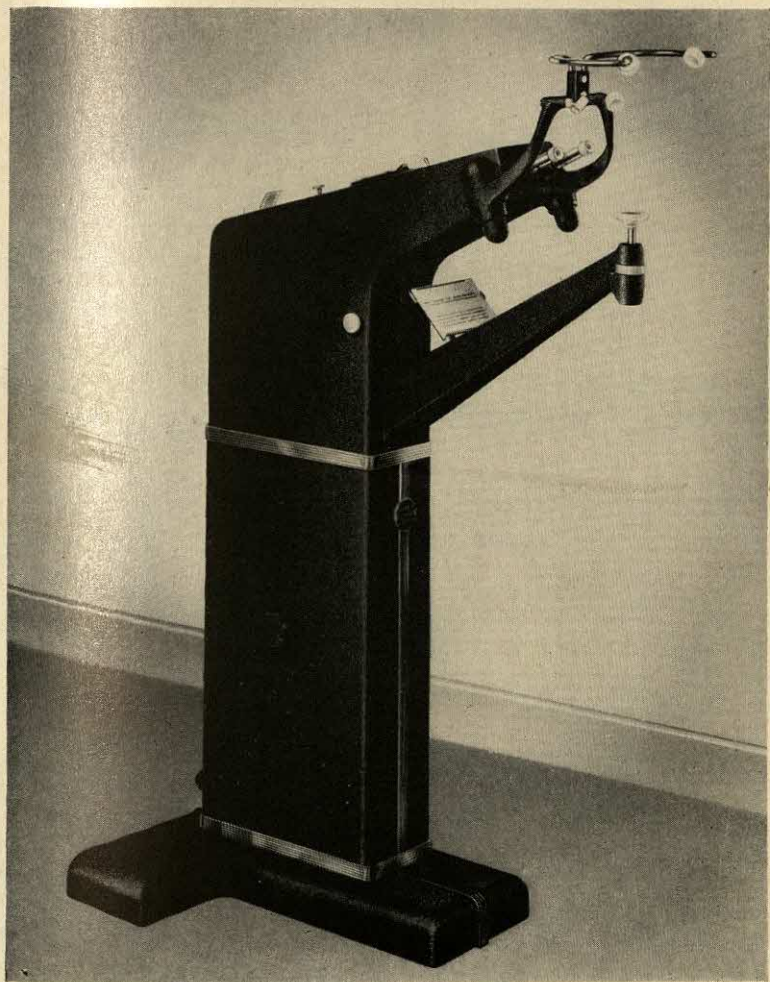
FIG. 24.—The Ophthalmograph. Courtesy of the American Optical Co.
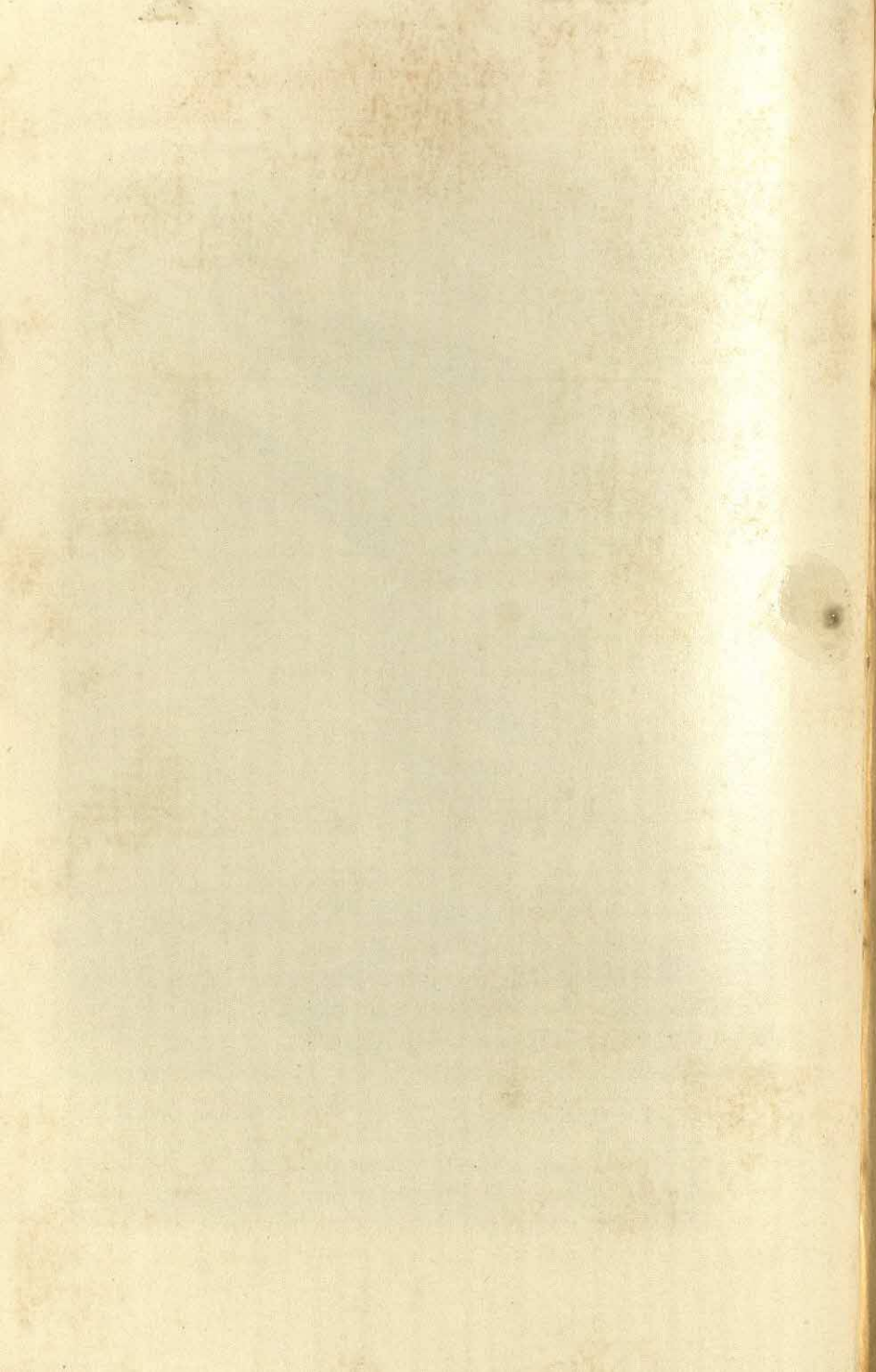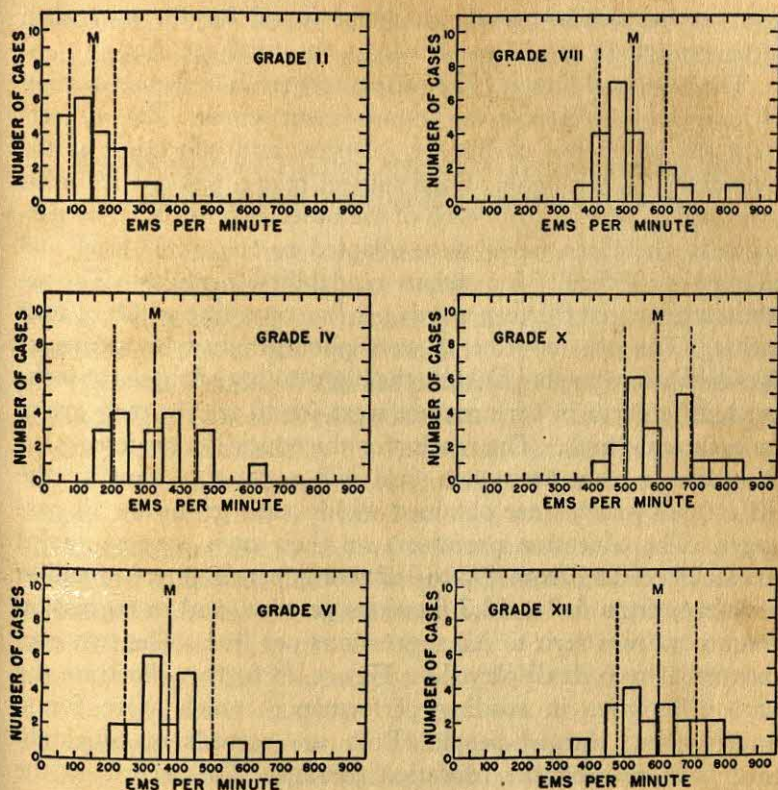
FIG. 25.—Distributions for rate of reading for pupils in grades two to twelve, on the easy passage. Ballantine, (17, p. 102), by permission of the University of Michigan Press.

grade groups included in his study. The mean of each distribution is shown by the center line marked with an M. The fine dotted lines mark off one standard deviation to each side of the mean. Wide individual differences are apparent in each grade. This intragroup individual variation far exceeds the differences between the intergroup averages. Even though the groups are two grades apart, an enormous amount of overlapping exists between distributions. The fastest reader in the second grade read all but as rapidly as the slowest reader in the twelfth grade. Since rate is a composite measure of eye movements, we can

assume that similar results would be found for the individual measures which can be plotted from the total record.

The results of Dixon (82) offer another vivid demonstration of individual differences in eye-movement scores. His subjects were the professors of history, physics, and education at the University of Michigan. Each subject read a passage from his own field as well as from each of the other two fields. The passages in the three fields were adapted to the adult level and equated for difficulty by various readability formulas. The selections averaged thirteen words per line on a line width of four inches. The eye movements were photographed by means of the Ophthalmograph. Despite the high calibre of these subjects, large differences in performance were found within each group on each paragraph. The results for the education professors on the passage from their own field will serve to exemplify the differences which were obtained within each group on all passages. The education professors on their own passage varied in rate of reading from 498 to 187 words per minute, in fixation frequency from 5.4 to 14.3 fixations per line, and in regression frequency from zero to 3.3 regressions per line. The two eye-movement records displayed on Figure 28 further illustrate the vast differences in reading performance which were found among these learned people. Both are records of education professors reading the education passage. The record on the left was obtained from one of the fastest readers in this group, the record on the right from one of the slowest. The rapid reader covered eleven lines of material in the time taken by the slow reader to navigate four. The former read more than twice as rapidly as the latter. The records show interesting differences in detail. The fast reader made no regressions if we exclude refixations at the beginning of the line. The slow reader made five regressions on the first line alone. The fixations of the good reader were few in number and brief in duration. The poor reader, by comparison, made fixations profusely, and his pauses were variable and often long in duration. A difference in pattern appears between the two records. The record of the good reader reveals a regularity of pattern along the line as well as considerable repetition of pattern from

line to line. The record of the poor reader discloses no such uniformity. Similar differences could easily be demonstrated among the records of the history and physics professors.

Eye-Movement Pacing Exercises as Related to the Individuality of Eye-Movement Patterns

The fact that there are these differences between the eye movements of good and poor readers suggests the possibility of improving reading by training the poor reader to emulate the eye movements of the good reader. The Metronoscope and the Harvard Reading Films are perhaps the best known training aids which have been developed to that end. The Metronoscope, which is manufactured by the American Optical Company along with the Ophthalmograph, is essentially a triple-shutter tachistoscope. The material is printed on rolls which are placed in the instrument after the fashion of rolls of music in a player piano. The material unfolds line by line behind the shutters, which open and close in succession, so as to expose each line of print in three spaced phrases. The rate of exposure is regulated by a speed control. Pupils are encouraged by this method to read each line in only three fixations. Regressions are discouraged by the operation of the shutters which expose only one phrase at a time. The Harvard Reading Films accomplish the same purpose by a motion picture method (74, 75). The phrases appear on the screen as bright exposures on a dim image of a whole page. Rate can be varied by adjusting the speed control on the projector.

These and similar devices have been used extensively in schools and clinics throughout the country. According to one report, over three hundred colleges and universities employ these methods in remedial work with their own students. Unfortunately, research has not conclusively demonstrated that any lasting benefit is derived from eye-movement training as such. The whole approach requires reexamination. We have already seen how widely children of the same age or grade differ in their eye-movement behavior. These differences are deep-seated and the individual patterns are not easily modified

by outside pressures. The results of Morse (235) throw light on the fundamental nature of the problem. His subjects were 54 fifth-grade and 54 seventh-grade pupils, selected from the normal range of each grade. Eye-movement records were obtained from both groups on each of three different paragraphs. The passages for the fifth-grade pupils were of third-, fifth-, and seventh-grade difficulty, while those for the seventh-grade group were of fifth-, seventh-, and ninth-grade difficulty. The fifth- and seventh-grade passages were the same for both groups. The passages were scaled in difficulty by a number of readability formulas.

The camera used was the Ophthalmograph. The eye-movement scores obtained were fixation and regression frequency and rate of reading. Contrary to expectations, Morse did not find that the group averages for these measures changed in a consistent fashion with increase in the difficulty of the material. The failure of the group results to vary significantly with difficulty invited an inspection of the individual records. In individual cases these records were remarkably alike from passage to passage. The records exhibited on Figure 29 illustrate this finding. These records show how one of the seventh-grade pupils read the three passages for his group. The pattern is surprisingly uniform from one record to the next. The first five lines of these records are in almost perfect phase relationship. Careful study of the three photographs will reveal other similarities in detail.

Eye-movement patterns vary widely among individuals, but each child tends to have a pattern of his own. This individuality of pattern is not confined to children. The records displayed on Figure 30 were obtained from a college student. The first record is based on a passage of English prose, the other on a comparable passage written in Hebrew. The second record appears reversed, because Hebrew is read from right to left. Except for this difference in orientation, the two records could easily be taken as parts of the same record. They reveal a distinct individuality. Such findings suggest that eye-movement patterns are centrally organized.

The same shoe fits Ballantine's failure to find significant differences between the results for his easy and graded passages. Age differences exist, but at any one stage the child tends to read different materials with a constant pattern of eye movements. Morse found differences between his groups, just as did Ballantine. These differences favored the seventh-grade subjects in all possible comparisons. This finding was to be expected in the case of each of the two passages which the groups read in common because these passages were easier for the older than for the younger subjects. It was probably less to be expected that the seventh-grade pupils should also excel their fifth-grade cousins on seventh- versus fifth-grade material, on fifth- versus third-grade material, and on ninth- versus seventh-grade material, because in each of these comparisons the passages were designed to be of equal difficulty for the two groups. The seventh-grade group even performed more efficiently on the ninth-grade passage than the fifth-grade group did on the third-grade passage. In addition to demonstrating an age effect, these findings clearly reveal the rigidity of pattern which characterizes the eye movements of children at this stage of development. As one competent observer put the matter, "the pattern takes possession of the child."

What is needed now is a longitudinal investigation of age changes in eye-movement scores. Such a study would make possible an analysis of individual growth in the various measures. It is likely that the same relationship would be found between these measures and total growth as exists between paper-and-pencil reading scores and total growth. In other words, the differences which children reveal in their eye movements probably express the uniqueness of growth in general. The same factors which influence total growth affect eye movements. It is known, for example, that eye-movement patterns reflect a familial influence. In one experiment, Morgan (233) obtained photographic records of the eye movements in reading of 33 pairs of fraternal twins, 36 pairs of identical twins, and 40 matched pairs of unrelated children. Correlations were computed between the eye-movement scores for the pairs within

each group. These correlations for the different measures ranged from .04 to .24 for the artificial pairs, from .24 to .53 for the fraternal twins, and from .61 to .72 for the identical twins. In a similar study, Jones and Morgan (189) obtained median intrapair correlations of .105 for a group of artificial pairs, .435 for a group of fraternal twins, and .530 for a group of identical twins. The fact that in both studies the highest correlations were found for the most closely related pairs indicates that eye-movement patterns are not determined by training alone, but that they also reveal the handiwork of genetic factors. To cap off their experiment, Jones and Morgan mixed the records of the fraternal twins with those of the identical twins and asked three judges to match the records which belonged to each set of identical twins. These judges were able to perform this stunt with significantly better than chance success from a visual inspection of the records alone. The records of the identical twins revealed a similarity which helped the judges distinguish one set from another. The closest resemblance between records can be expected from retests of the same individual.

The familial influence which the above studies disclose helps to explain the individuality of eye-movement behavior. Should we interfere with this individuality? Can we bring a greater wisdom to bear by trying to force all children to adopt a set pattern of eye movements? As Olson points out, the matter boils down to the question "of self-regulation versus coercion and standardization in child care" (246, p. 138). Evidence that eye-movement training devices accomplish their purpose is far from reassuring. Individuals continue to differ widely in their eye movements even after training, which suggests that they still persist in reading in their own way. These devices expect the impossible of the individual anyway. Textbook statements that superior readers make only three or four fixations per line are misleading generalizations of the facts. Such statements generally refer to Buswell's study of maturational changes in eye movements. In this study a limited amount of evidence of reading with as few as three or four fixations per line was

obtained from a few of the high-school and college subjects. However, Buswell used a line of only 21 picas, rather short by most standards. By translating Buswell's results in terms of 24 and 28 pica lines, Stroud (307) demonstrated that six or seven fixations per line represents a truer picture of the performance of the mature reader on material as ordinarily printed. Even this estimate is probably too low. In a study of the eye movements of fifty superior readers from a University of Iowa population, Walker (350) obtained an average of almost eight fixations per line on material of moderate difficulty. Dixon's results are even more arresting if one considers the population which he tested. Whatever else may be said of college professors, they should be able to read. Yet Dixon found that his subjects made a grand average of 8.56 fixations per line on all paragraphs. Would anyone deign to construct a training aid calling for eight or nine fixations per line?

Eye-movement pacing devices are hard to reconcile with a number of other facts. One of the first discoveries to be made in experiments with a tachistoscope is that the size of the perceptual span varies with meaning (53, 98). The more meaningful the exposure material, the wider the span. Other studies (138, 170) have established the fact that good readers have a wider span than poor readers, but only if meaningful materials are used. These studies have not demonstrated that good and poor readers differ appreciably in the size of their span for nonsense materials. Such results indicate that the real problem is not that poor readers suffer a narrow span *per se,* but that they do not get the same meaning from material as good readers. It is of interest in this connection to compare the size of the span in tachistoscopic reading with the size of the fixations in normal reading. Experiments (350) have shown that the former is usually at least twice the size of the latter for the same individual. Only rarely does the individual even approach in his fixations in normal reading the size of his perceptual span in tachistoscopic reading. In other words, the reader already has more range of apprehension that he ordinarily uses. Reading rates would reach astronomical figures if use were made of every

last bit of the perceptual span demonstrated in tachistoscopic experiments. The finding of Cattell (53) that the average adult reader can perceive a short sentence of four words in 1/100 of a second of exposure time offers a good test case. That amounts to a rate of 400 words per second, or 24,000 word per minute. Who reads that fast? A foolish question, to be sure, but enough to indicate that slow reading cannot be attributed to a lack of span. The reader normally has span to burn. The reason why he does not make greater use of his visual capabilities is that at each fixation the eye will take in only as much as the mind will comprehend. The mind is the limiting factor, not the range of vision. Efforts to increase the reading span by means of short-exposure methods tend, therefore, to put the cart before the horse. The time might better be spent on promoting growth in comprehension.

SUMMARY

In reading, the eyes move not by a steady sweep across the line, but by a series of short jumps separated by pauses. The "peephole" and mirror methods of direct observation reveal the general character of these movements. More accurate measurements are possible by means of the photographic and electrical methods of recording. The principal measures of the eye movements in reading are fixation and regression frequency and pause duration. Rate of reading is a composite measure of eye movements. Important age changes occur in all these measures, as well as in the eye-voice span, which is a related measure. At any one stage, however, each child tends to have a pattern of eye movements which is peculiarly his own. Eye-movement pacing devices seem difficult to defend in the light of this expression of individuality.

The next chapter discusses the psychology of learning to read. Growth or maturation remains merely a condition for learning. The child does not "grow" into reading naturally. He learns to read. From that standpoint, curves representing age changes in eye-movement scores might just as well be called
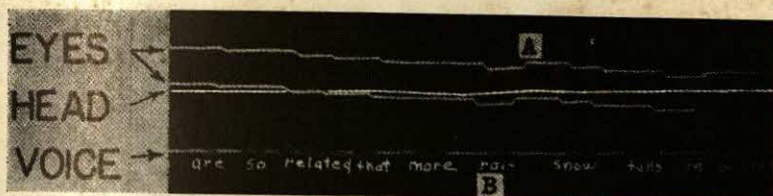
FIG. 26.—Simultaneous record of the eye movements and voice in oral reading. From Tiffin and Fairbanks (328, p. 73), by permission of Psychological Monographs and the American Psychological Association.
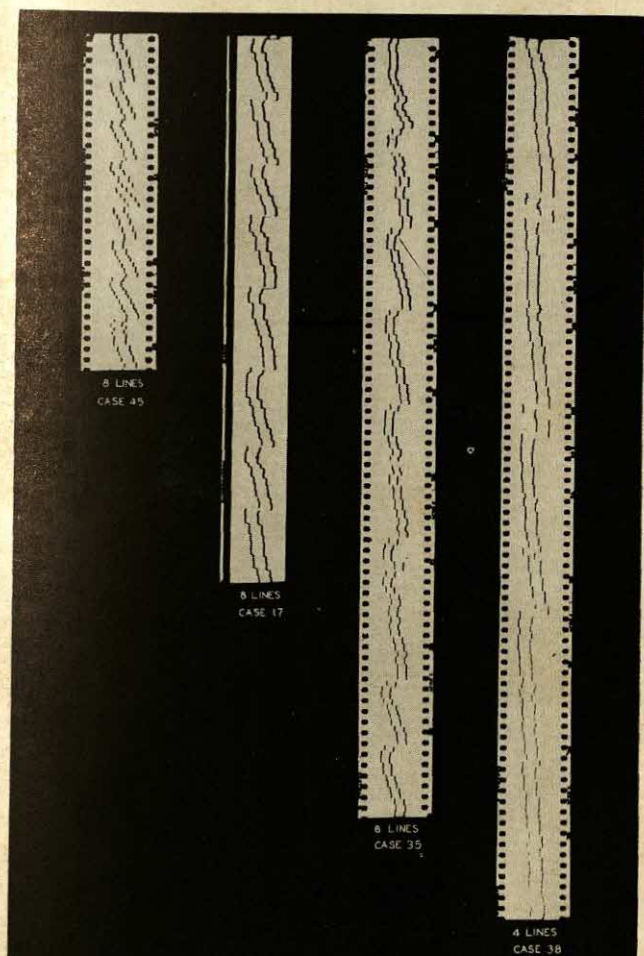
FIG. 27.—Individual differences in eye movements among four seventh-grade children reading seventh-grade material. From Morse (235, p. 54), by permission of the University of Michigan Press.
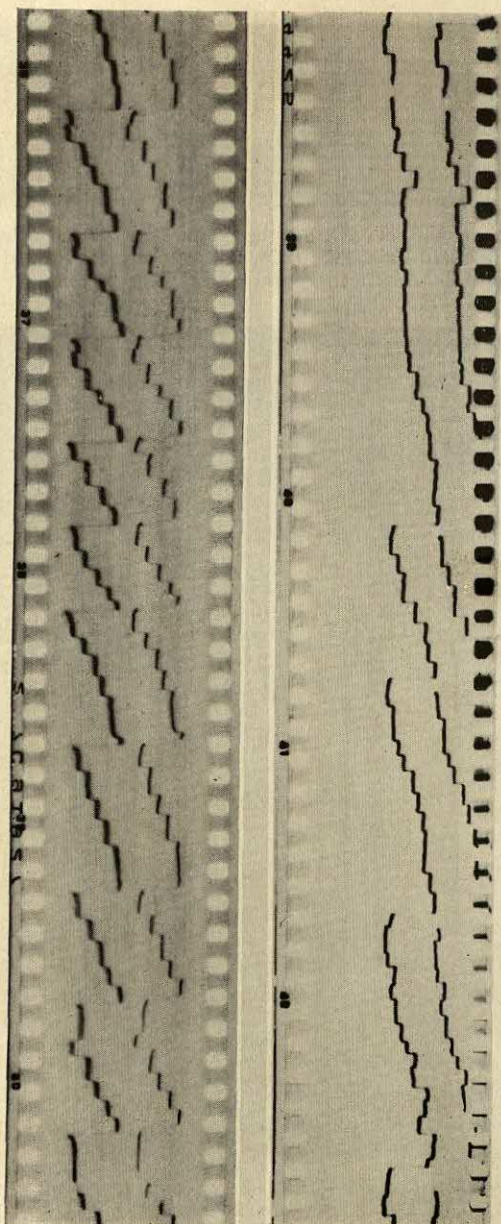
Fig. 28.—Sample eye-movement records illustrating individual differences in performance of education professors reading the education passage. From Dixon (82, p. 163), by permission of the University of Michigan Press.
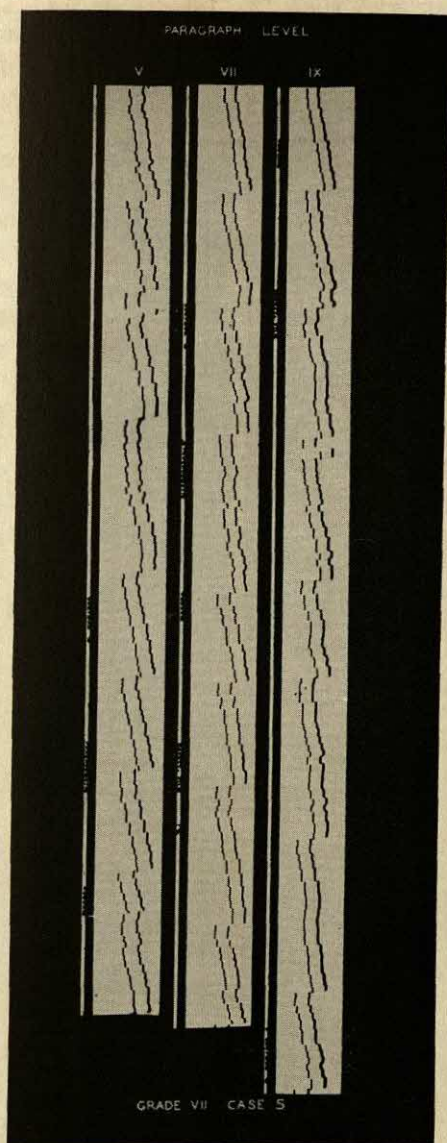
Fig. 29.—Sample eye-movement records of a seventh-grade pupil reading passages of varying difficulty. From Morse (235, p. 50), by permission of the University of Michigan Press.
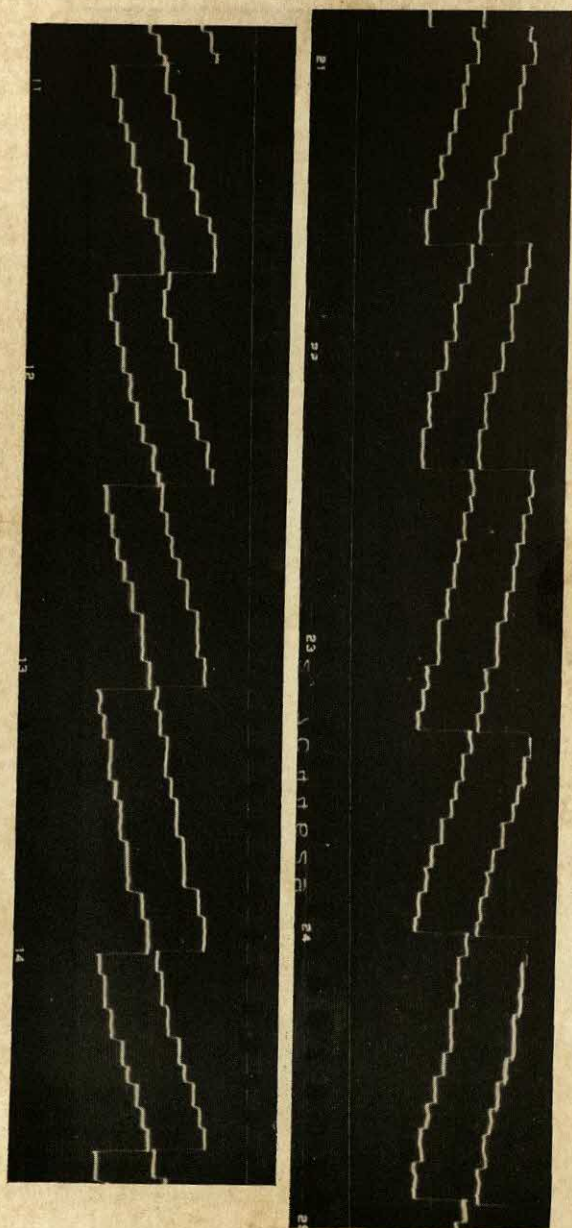
FIG. 30.—Sample eye-movement records illustrating the similarity of pattern in the reading of English and Hebrew by the same subject.

learning curves as growth curves. Without learning, the curves would show no change with age. A discussion of the process of learning to read, therefore, is indicated at this point. An understanding of how children learn to read is necessary if adequate methods are to be devised to promote "growth" in reading.

Chapter 4

THE PSYCHOLOGY OF LEARNING TO READ

Introduction

When it comes to teaching reading, teachers naturally want to know what method to use. This is a fair question, and it calls for a fair answer, but it cannot be answered through a study of methods alone. In fact, there is only one way in which it can be answered, and that is to first ask another question which has to do not with the teacher but with the child. Specifically, the teacher must first ask: By what process does the child learn to read? On the answer to this question the method to use always depends. In other words, the teaching process must take its cue from the learning process, and the rule to apply is simply as follows: *Having found out by what process the child does learn, select the method which best sets the conditions for that type of learning.* The object of the present chapter is to develop a methodology of teaching reading in terms of this principle.

Learning to Read as a Process of Associative Learning

Learning to read involves what is perhaps the oldest concept of learning in psychology. Aristotle recognized it first, and almost every writer on psychology since has had something to say about it. We refer, of course, to the concept of associative learning. As ancient as it is, there is none that better explains the case at hand. Learning to read is primarily a process of associative learning.

The association in learning to read is that between the sight of the word and the child's response to the sound of it. That

is, the child may be said to have learned to read when he makes the physical, mental, and emotional responses to the printed word that he would make upon hearing the word spoken in an oral context identical with the printed one. This concept of learning to read is obviously related to the order of development of the language-related skills. Learning to respond appropriately to spoken language comes first. The child next learns to say the words himself. Then he learns to read. Reading is a controlled form of talking in which the words on the page are substituted for the usual stimuli for speech. Teaching a child to read consists mainly in setting the conditions for this stimulus substitution.

THE "LOOK-AND-SAY" METHOD

Learning by association requires the presentation of the new stimulus simultaneously with the response to the old. In teaching reading, these conditions can be met by showing the word to the child and pronouncing it for him. After some repetition, the response to the sound of the word will become associated with the sight of it. The oral stimulus can then be omitted, and the sight of the word alone will carry the response or recognition. During the early stages of learning to read by this method, the response includes the saying of the word. For that reason, the procedure has been described as the "look-and-say" method of teaching reading, nowadays a standard approach.

The conditions of the "look-and-say" method are plotted on the diagram of Figure 31. The reader will doubtless recognize the diagram as the same as that for the conditioned response. That is as it should be. Conditioning is the modern nomenclature for associative learning. Learning to read by the "look-and-say" method is an example of conditioning. Book (36) has skillfully related learning to read to the process of conditioning and has demonstrated how both are a process of association.

To the Russian physiologist Pavlov, of course, belongs the credit for demonstrating the phenomenon of conditioning in a carefully controlled laboratory situation. The concept of conditioning makes possible a restatement of association in terms of

stimulus and response, and thus a better description of the
learning process and one susceptible to better control and meas-
urement. Pavlov's experiments, as is now generally known,
were made on the salivary reflexes of dogs. The natural or
adequate stimulus to the functioning of the salivary gland is
the presence of food in the mouth. In human beings, the mere
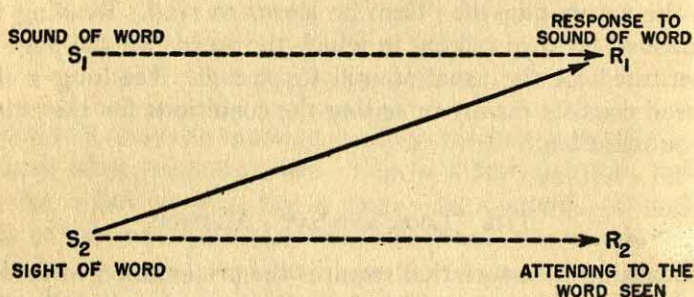
Fɪɢ. 31.—Conditions of the "look-and-say" method.

sight or smell of food or the ringing of a bell at dinner time
will also produce a watering of the mouth, but these are doubt-
less all acquired reactions. In the case of the dog, however, the
ringing of a bell at least will ordinarily have no such effect.
It does cause a tension or perking of the ears as in listening.
If, however, a bell is rung regularly when the dog is fed, this
sound of the bell will soon have an effect on his feeding re-
sponses. After a time, even if no food is presented, the sound
of the bell will produce a flow of saliva. The bell may be called
an acquired or substitute stimulus for one of the responses of
eating, or if one thinks of the response, one may speak of an
acquired response to a given stimulus. In learning to read by
the "look-and-say" method, the sound of the word may be
regarded as the old or adequate stimulus, and the sight of the
word as the new or substitute stimulus.

It should be emphasized that learning by association or
conditioning ideally requires the occurrence of the new stimulus
simultaneously with the response to the old stimulus. In the

case of the "look-and-say" method, this requirement means that the eyes should be on the word at the exact time the response is made to the sound of the word. "Look at the word before you say it," the teacher admonishes the pupil. This is good advice because children do not always look at the word before they say it. As Guthrie notes, "many nonreaders among children foil our efforts because they have established habits of looking away from the printed word to which we point" (147, p. 25). The following is a situation which frequently occurs when the teacher is seated beside the child, listening to him read orally. The child comes to a word which he does not know, so he turns to the teacher for help. She proceeds to supply it for him, but the child repeats the word while still looking at the teacher or while in the act of turning his eyes back to the page. Sometimes the children do not even bother to give the word a second look, but go right on to the next. One child had the habit of covering the word with his finger as a means of keeping his place when he turned to the teacher for aid. He would then say the word upon being told what it was, but he kept his finger riveted to the word until he was ready to go on. Failure to retain words under any of these conditions is not surprising. Seeing the word merely in the mind's eye is an all too fleeting stimulus. It is better if the word is plainly in view *at the time* the response is made. This may seem like a small point, but the writer has observed teachers having to supply the same words over and over again for what seemed like a failure to keep it in mind. The occurrence of the new stimulus simultaneously with the response to the old is *the* desideratum of good learning.[1] One of the reasons why Fernald's kinesthetic method may be effective in individual cases is that it virtually compels the child to look at the word simultaneously as he utters it. We have elsewhere (10) described a sound motion-picture technique for teaching beginning reading, in which the timing of the response to the sound of the word, simultaneously with its appearance on the screen, is one of the central conditions.

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[1] Here is a question to sleep on: Why might the "look-and-say" method better be called the "look-while-you-say" method?

The Meaning of Word Symbols

The older law of association was expressed in subjective terms; it dealt with the connection of ideas in the mind. In that sense, learning to read has often been described in terms of an association between the visual symbol and the sound of the word. This is something of an error: the association is not between stimuli but between stimuli and a given response. In handling and eating an apple, the taste of the apple, the feeling of its roundness, the sight of its redness are associated through the act of handling and eating. Stimuli affecting the organism while a response is in progress all *tend,* on their reoccurrence, to elicit that response. Two or more stimuli are thus associated only in the sense that they become possible activators of the same response. Printed words acquire meaning through association with the same reactions which first attach to the word sounds. The visual symbol is not connected with its sound except as both are associated with common reactions.

The Meaning of Word Sounds.—The way in which word sounds first acquire meaning is, of course, well known. It is another example of the operation of our old friend, the principle of conditioning. If, when a child is handed an apple, he is regularly told the fruit's name, sooner or later the youngster will make the connection between the object and its name. The sound of the word alone may then provoke a glance or set toward the bowl of fruit on the table which contains an apple. The name has acquired the same drawing power as the object itself. Similarly, if a word is suited to an action, like exchanging a kiss for a kiss, the sound of the word alone will eventually become sufficient to invite a kiss.

We may take another example from animal learning: If I wish to teach my dog to give me his paw before he is fed, when he is standing up on his hind legs to "noze" a tempting plate of food, I may take one of his paws in my hand, and at the same time say: "Give me your paw." For a time he may stretch himself, stand up, partially projecting his paw, and make many other responses and then only when the *tempting* food is held

up (he may be rather indifferent to canned food if his responses are being conditioned on fresh beef steak). After many repetitions of this situation the dog will however learn, when standing, even without the presence of food, to hold up his paw at the command "Give me your paw."

Here we see a new (auditory) stimulus being added to the previously existing pattern of stimuli—to wit, the sight or smell of food and the *gnawings* of hunger—which produce the diffuse responses of standing up, stretching, jumping, etc. With repetition, the new stimulus alone, even when the dog is not hungry, will be sufficient to release these responses. Even the month-old infant may exhibit sucking movements at the sound of its mother's voice. To begin with, the touch of a nipple on the infant's lips may have been needed to set off the sucking movement, but soon any sounds or sights which regularly accompany the feeding time may set off feeding responses. Other sights and sounds become stimuli or signals for going out to play or for going to bed. The learning of a language is thus the associating, in the first instance, of a word sound with an activity, a situation, or with just some thing. The sounds acquire meaning (or become a part of language) simply by occurring at the time an activity is in process, that is, when we are responding to some situation or thing. Thus John Locke in 1690, in his *Essay Concerning Human Understanding,* writes: "If we will observe how children learn languages, we shall find that to make them understand what the names of simple ideas or substances stand for, people ordinarily show them the things whereof they would have them have the idea; and then repeat to them the name that stands for it, as white, sweet, milk, sugar, cat, dog, . . . " Locke speaks of the connecting of the name with the thing or the idea, whereas we have preferred to speak in terms of stimulus and response; but this is a difference which we have already resolved. Without response there is no association.

The First Steps in Learning to Read.—In a like manner, we may describe the initial steps in the child's learning to read as a process of adding new stimuli to old responses. If we wish

to give meaning to the printed word "father," we (or the first-grade teachers) talk about "father" so as to reinstate in the child's mind the attitudes and ideas which go with father. We say the word "father," and he repeats it. We may then show him a picture of father at home, and at the same time show the printed symbol. Soon the sight of the word "father" will lead to much the same incipient responses as the saying of the word "father" or perhaps even the presence of the father. So the most effective method of teaching a foreign language is through the associating of the foreign word with an actual activity. This is the so-called "direct method" of foreign-language instruction. Instead of first associating the foreign word with the word in the vernacular, the word is associated with an activity by being presented when the activity in question is in progress. If the child hears the words "ferme la porte," as he is performing the act of closing the door, these words, when repeated, will be found to have become the stimuli for the act of closing the door.

THE RELATION OF READING TO ORAL LANGUAGE

When is a child ready to read? One capable teacher of primary reading has in effect answered: When he begins to take an interest in words by noting the name on the street sign, on the "stop" and "go" sign, or on the "hot" and "cold" water faucet; by asking how to write his own name, or what that word in the funnies is, or what a poster announcing a new movie says. In a word, when he once gets the idea that those black marks on white surfaces actually say something and he wants to know what, he is then ready for learning to read.

Since children normally learn to talk before they learn to read, they can learn to read by learning to say the words from the printed symbols. If the word is a familiar one, the saying of it will arouse its meaning because the child will respond to the sound of his own pronunciation of it, much as if he heard someone else say it. This is obviously the *modus operandi* of the "look-and-say" method. As Harris expresses the matter:

In its beginning stages, learning to read means learning that queer-looking marks stand for speech. The child "reads" when he is able to

say the words which are represented by the printed marks. The child
may say the words out loud, or he may say them to himself; in either
case, reading means saying the correct words. If the child says the
right words, they fall into a familiar sequence whose meaning is appar-
ent to him because of his previous acquired facility in comprehending
speech. If he says the wrong word, if he has to leave out too many
words because he does not recognize them, or if his recognition is so
slow and halting that the words are not heard as coming in the mean-
ingful sequences that we call phrases and sentences, the approximation
to heard speech will not be sufficiently good to convey the correct mean-
ing. The discovery that printed words "talk" is the first step in learning
to read (151, p. 7).

The reason why the visual symbol of the printed word is first
associated with the spoken word is, then, that the spoken word
already carries meaning for the speaker. This may not, how-
ever, always be the case. The language used in the school may
not be the child's own method of expression, and therefore the
child may not get the meaning expected. We are all familiar
with children who have learned to "talk" words parrot fashion,
without the words having much if any meaning or significance
to them. The teacher must then find out "for sure," quite apart
from the visual symbol, whether the children sense and can or
do express orally what the matter is all about. The visual
symbols must then be associated with the child's (not the
teacher's or anyone else's) way of expressing the idea. If the
language which the child understands is not that of the school,
then things must be talked over until his own language becomes
suited to school learning.

The point to be emphasized here is neatly illustrated by an
incident described by Browne (40) in a doctoral dissertation
submitted to the Harvard Graduate School of Education. It is
one of those rare theses in which the author managed to intro-
duce a bit of humor. As the incident is described, a boy in
the first grade was reading aloud monotonously and without
any show of interest or concern about the sentence: "Johnny
does not have a dog." The situation suddenly took a turn for
the better when the teacher explained that what the sentence
meant was "Johnny done got no dog." Now that *was* too bad.

he *should* have one, and there were plenty of overt expressions of sympathy and general agreement that under the circumstances Johnny should by all means have a dog. The authors of instructional material for the training programs of the armed forces during the last war were encouraged to get down to the level of the enlisted personnel. The writer of a handbook on radar operation had included in his copy the sentence: "On certain nights reception is awful." The typist questioned whether the word "awful" was good usage. The author of this frightful blunder exclaimed: "You're right, change it to, 'On certain nights the reception is lousy.'" Youngsters learn to respond to the language they have heard, and they pick up the speech habits of their surroundings. The easiest words for children to learn to read are those which occur in their conversation (161). We are not proposing that beginning materials be written in the vernacular of the Dead-end Kids, although it helps to write material in the way that children talk, so long as the style is reasonably standard.

How speech serves to arouse meaning is convincingly revealed by the failure of the word to make sense when it is mispronounced. A common example is that of a child working on a word by the phonetic method. Every teacher of reading is aware of the trial and error that often goes into the process. The child may be observed to mouth the word first in one way, then in another way. Nothing seems to work. Suddenly he hits upon just the right combination of speech movements and just as suddenly the word registers. It registers because it now sounds and feels right. It is an example of the "Aha" phenomenon (the token of insight of the Gestaltists). Rogers (281) administered a word-pronunciation test to 72 poor silent readers among college freshmen, and found that of the words which were mispronounced, 78 per cent were also missed in meaning. For the same reason, little is gained at the start by teaching the child to read words, the correct pronunciation of which is unfamiliar to his ears. One school which has come to the writer's attention takes great pride in teaching its first-grade youngsters to read and spell such words as "quintessence," "homogenize," and "jurisdiction." Such accomplishments are

offered as proof of the superiority of the phonetic method, which is the method employed by this school. The teachers admit that the children do not always know the meaning of the words. One wonders, therefore, what purpose is served. Meaning is the *sine qua non* of learning to read. The most common cause of failure to retain words is that the words have no meaning for the child. The results of Ebbinghaus applied the clincher to that. Every student of the first course in psychology will be reminded of the form of his forgetting curve for non-sense syllables. Words which are not already a part of the child's meaning vocabulary amount to nonsense syllables. The thoughtful teacher of reading will accordingly resort to a vocabulary which is rich in meaning and which rings true to the ears.

The relation of reading to *oral* language background is clearly brought out by studies which have been made of the relationship between hearing vocabulary and comprehension and reading vocabulary and comprehension. These studies have shown that the relationship is extremely close. Anderson and Fairbanks (11) obtained a correlation of .80 between the hearing and reading vocabularies of 220 college freshmen representing all degrees of reading achievement. The poorest readers in the group had small hearing as well as reading vocabularies. By the same token, the best readers ranked high on both counts. In a study in which elementary school pupils were used as subjects, Young (367) found a correlation of .80 between hearing and reading comprehension of paragraph material. Larsen and Feder (205) have similarly reported positive and substantially high correlations between hearing and reading vocabulary and comprehension scores. The intimate relationship which exists between reading and oral language has also been effectively demonstrated by Hildreth (163). Knowledge of the spoken word comes first and sets the standard of reading achievement that can be reached. Reference has already been made to the difficulties which children encounter in learning to read when they have not had the support of a good language atmosphere at home. It can hardly be otherwise. Hearing vocabulary constitutes the major source of words that the child can and does learn to read.

Durrell and Sullivan (93) have devised a set of reading capacity and achievement tests based on the relationship between hearing and reading vocabulary and comprehension. The capacity test is simply a standardized measure of hearing vocabulary and comprehension. High scores on this test are taken to indicate good capacity for reading, low scores, poor capacity. The reading achievement test which Durrell and Sullivan have included provides a means of estimating whether the child is reading up to capacity as measured by the other test. The two tests together make for some interesting comparisons and analyses. In general, scores on the two run fairly close together. Children with high scores on the one are likely to have high scores on the other, just as children with low scores fall in double trouble. Exceptions occur. The results quite often turn up children who have conspicuously higher scores on the capacity test than on the reading test. Such cases are said not to be reading up to capacity, and remedial measures may be indicated. The reverse can also happen, in which the reading test yields the higher score. It perhaps can be said of those children that they make skillful use of the context in their reading. The unfortunate ones are those who have neither the capacity nor achievement. For such cases a wealthy program of oral language activities is recommended as preparation for reading.

The importance of speech—of both hearing oneself speak as well as of listening to the speech of others; of learning to discriminate between words of similar sounds; of vocabulary building; of getting the precise meaning of words; of increasing in general one's powers of oral expression—is such that this phase of readying the child for reading can scarcely be overdone. The same cannot be said, at least with equal assurance, of the exercises for visual discrimination and training which are commonly employed in the reading readiness workbooks. Matching similar objects and discriminating between different objects may not help as much as thought in recognizing similar elements in and noting differences between words. Recognizing, for example, a not-even ugly baby duckling in a brood of baby chicks, and vice versa, a baby chick in a brood of ducklings, may not

help in the differentiation of "horse" from "house"—even though the "context clues" may be equally pointed!

A young child's powers of observation and of visual discrimination for matters in which he is interested and has some background of experience may be extraordinarily good, and he may need only to have them directed (through arousing his interests and extending his experiences) to where he can use them. To give an example: In the primer or preprimer of a currently used series of readers, there is a picture of a toy airplane caught in the branch of a tree. Unfortunately for one young reader, the artist in his sketchy fashion had left a small gap between the branch and the trunk of the tree. Only after persistent inquiries as to why the airplane (and presumably the branch) didn't fall down was the teacher led to examine the picture carefully enough to discover what she then explained as the artist's mistake. The young observer, however, was not otherwise given credit for what in another setting (say print) would have been regarded as acumen.

It should be said in passing that the method which Durrell and Sullivan have employed to measure capacity for reading serves the same purpose as an intelligence test. It has the advantage over most intelligence tests in that it entails no reading at all. This characteristic of the test makes it especially appropriate for poor or retarded readers who are likely to be rated unfairly by any mental test that requires reading.

The Silent or Sight Method

It is possible, of course, to teach reading without involving the spoken word. Printed symbols are really twice removed from their meaning, since they represent speech sounds, which in turn usually stand for objects. The child can get the meaning from pictures as well as from the spoken word. Another way of setting the conditions for learning to read, therefore, is to present the word, together with a suitable picture. In this case the child associates his response to the picture with the appearance of the word. The conditions of this method are diagrammed on Figure 32. No overt pronunciation of the words is neces-

sary either on the part of the pupil or the teacher, which is why the procedure is often referred to as the silent or sight method of teaching reading, as contrasted with the "look-and-say" method. Incidentally, the method is in the nature of an adapta-
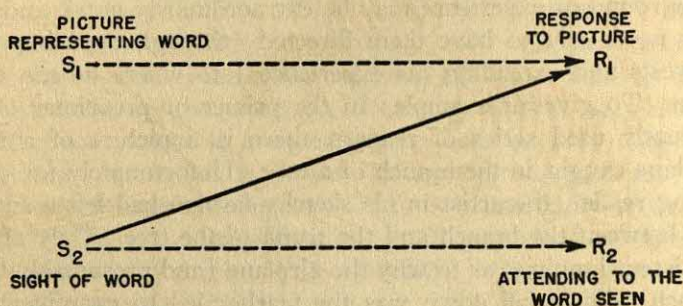
FIG. 32.—Conditions of the word-picture approach.

tion of Pestalozzi's famous method of object teaching. There would be nothing wrong with pairing the word with the child's response to the actual object. This is essentially what is done in the common kindergarten practice of labeling familiar objects around the room. If the children are already familiar with the objects, however, pictures of the objects serve the same purpose and may be a bit more convenient (see cartoon).

Any argument regarding the relative merits of the "look-and-say" procedure as compared with the visual or silent approach is likely to be of small practical importance. Each has its place, and virtually all beginning programs use a combination of the two anyway. Most of the points which can be made are minor and hardly more than notes of caution. To begin with, the "look-and-say" method does not absolutely guarantee that the child will know the meaning of the word after he has learned to pronounce it. Children can repeat words through sheer imitation, which is what the "look-and-say" procedure amounts to when the words are not already a part of the pupil's meaning or hearing vocabulary. Supplying words when youngsters are reading orally is essentially the same method. The point we are laboring is that, even though the children may be able to repeat the words after the teacher, they may or may not know what the

tiger

VIRGIL PARTCH

(Courtesy of the Artist.)

words mean. Learning to pronounce the words by the phonetic method suffers the same limitation. Dewey (80) found that children can often pronounce words correctly without being able to identify from pictures or a collection of objects what the words stand for. Many of the words in textbooks are alien to the children. Learning to read such words implies more than mere pronunciation.

The word-picture approach is more likely to assure the meaning of the word, for if the child can name or identify the picture, it is almost a sure sign that he has had the experiences, language and otherwise, to give meaning to the word. The dark side (shall we say of the picture?) is that not all words can be easily depicted in pictures, which is to say nothing about the difficulty of portraying relationships between words. Pictures, moreover, do not always control the child's response in the way that was intended; that is, the child may misname the picture. A picture

of "Puff," for example, may be called "cat" or "kitty." Mis-naming pictures may have an inhibiting effect when it comes to learning to read the words correctly. Children can get into trouble on the same basis while responding to test materials making use of pictures. A good example is the word recognition section of the Gates Primary Reading Tests (123). As the reader may know, each item of this test presents a picture together with four words, one of which names or labels the picture correctly and the child is instructed to mark the right word. It is the familiar type of multiple-choice test device. Often, however, the child cannot find the word he is looking for, the reason being that he calls a picture of a copper coin, "penny," instead of "cent," the picture of a rocking horse, "horse," instead of "toy," the picture of a barking dog, "dog," instead of "bark," and so forth. We can say of the "look-and-say" approach that it does control the child's response with a high degree of accuracy. The child is not going to say "cat" or "kitty" for "Puff," when "Puff" is what he hears.

THE NONORAL HYPOTHESIS

Learning to read by the "look-and-say" method, at the start, is mainly an oral process. The word-picture approach permits the child to keep the words to himself. Is purely visual reading, omitting entirely the speech response, possible? Years ago, Huey (180) asked this question, and the idea has been revived in modern times by James E. McDade, formerly an official of the Chicago Public Schools. McDade (217) sponsors a method of beginning reading which requires no oral reading at all. The pupils are told not even to say the words to themselves. Words are matched with objects, pictures, and actions. A period of oral preparation *precedes* the reading lesson. The oral and printed symbol are never brought together at the same time, however. The pupils are urged merely to "think" the meaning of the printed symbols. The method is supposed to proceed by direct association between visual symbol and meaning. As Keener puts it, "the heart of the nonoral procedure is the fact that children are introduced to the reading activities as a *see*

and comprehend process rather than as a *see, say, and compre-hend process"* (193, p. 291).

McDade's method constitutes an effort to get around the habit of vocalization. That many people move their lips while reading silently is, of course, a common observation. This habit has been regarded by some authorities as being a carryover of too much oral reading early in the grades. McDade's idea is to avoid the habit by eliminating oral reading altogether from the first methods of teaching reading. The argument is that if the child does not vocalize while learning to read, he cannot very well develop the habit of vocalization.

Eliminating oral reading entirely from the beginning reading program seems a bit extreme unless the evidence clearly justifies it. Fundamentally, the nonoral hypothesis rests on the assumption that oral and silent reading are distinct processes. The evidence for this assumption is worth examining in some detail, inasmuch as it strikes at the roots of the psychology of the reading process.

Eye Movements in Oral and Silent Reading.—The tendency to regard oral and silent reading as distinct processes stems from early research on the eye movements in reading. These early studies demonstrated that oral and silent reading can be differentiated in terms of various measures of eye movement. There are more fixations, more regressions, and longer pauses in oral reading than in silent reading. The reason for these differences is that in oral reading the rate of reading is reduced to the rate with which the individual can call words. Since the eyes very early become capable of traveling more rapidly than the voice, it follows that the eyes are going to be held back by the voice in oral reading. The eyes cannot suffer this drag without making more frequent fixations and regressions and pauses of longer duration.

Because oral and silent reading can be contrasted in terms of eye-movement behavior, authorities have been inclined to leap to the conclusion that the two processes must be very different. Judd, for example, who was one of the first to demonstrate experimentally the eye-movement differences in

oral and silent reading, concluded that "oral reading and silent reading are very different processes" (190, p. 24). Buswell, another pioneer in the experimental study of reading, likewise demonstrated that silent reading makes for more efficient eye movements than oral reading. His finding, Buswell said, "furnishes evidence that there is a fundamental difference between the oral- and silent-reading processes" (46, p. 39). Referring to the eye-movement evidence, Cole has declared that "the two processes are therefore the *precise reverse* of each other (58, pp. 61-62).

The implications of these conclusions for the teaching of reading are as follows: If an oral reading approach is used, the child will learn to read orally—nothing more. What may pass for silent reading will in reality be but a subdued form of oral reading, as evidenced by excessive vocalization. Thought-getting will suffer, and the eye movements will remain inefficient. By comparison, silent methods will result in thoughtful reading, efficient eye movements, and no vocalization. The silent approach may be just as one-sided, in that it will not teach effective oral reading. This does not matter, the sponsors of the nonoral approach say. Oral reading can be taught after the child has first learned to read well silently. Also, most of the reading that we do later on is silent anyway, so silent reading should be emphasized in the school.

An Experiment on Nonoral Reading.—One of the converts to the nonoral method is Buswell, who gives the following lucid account of the theory of nonoral reading:

Although, in principle, the schools have quite generally accepted the idea that the basic process in reading is a direct association between the words as perceived and their fused meaning, there are still many schools that have not sensed the full import of this relationship. There is still a considerable degree of intermixture of oral and silent reading in the primary grades. As a result, what often passes as silent reading is only noiseless reading. Psychologically, the oral process still persists, only instead of pronouncing the words aloud the child whispers them to himself, as evidenced by lip movements. The process of subvocalization may be so far suppressed that no lip movements or throat movements are observable, but the reader still is conscious of reading word

by word instead of being conscious of the meaning only. Completely silent reading, or "nonoral" reading, as it is sometimes called, is carried on without subvocalization or consciousness of words as words. It is similar to the auditory perception of speech. Few persons listening to a lecture follow the speaker by subvocalizing after him the words he speaks. If anyone doubts this, let him try to subvocalize after a speaker for a moment or so: he will soon be aware that auditory perception generally carries on by direct association between stimuli received by the ear and recognition of meaning without the accompaniment of subvocalization. Reading, at the most effective level, is a similar process (49, p. 524).

Buswell (48) has reported the results of an investigation designed to evaluate the nonoral method. The experiment was carried out in the Chicago Public Schools, and two groups of elementary schools were involved. The schools in the two groups were alike as to geographical location in the city and as to socioeconomic status of the pupils. One group of schools taught reading by the nonoral method. The schools in the other group continued in the traditional pattern, that is, teaching reading by means of a combination of oral and silent methods. The experiment was limited to Grades I and II, but the children were compared for reading performance when they reached Grade VI. Grade VI was used as the basis for evaluation in order to determine the more lasting effects of the method of teaching.

The reading achievement of the children in Grade VI was measured by a combination of two silent reading tests. Figure 33 presents the distributions of scores for 465 matched pairs of cases. A slight difference near the center of the distributions appears in favor of the nonoral group. The difference between the average scores for the two groups was only 2 test points. This difference may be compared with a range of individual variation within each group amounting to 75 points on the tests. Obviously, what the figure shows is not the importance of method but of individual differences in determining reading status. The method made absolutely no difference in the case of the low end of the distributions. Those children were poor readers either way. The same may be said for the high end of

the distributions. There the children were as good readers by
the one method as by the other. It is a remarkable demonstra-
tion of how unimportant the method is as compared with the
factor of the individual himself.
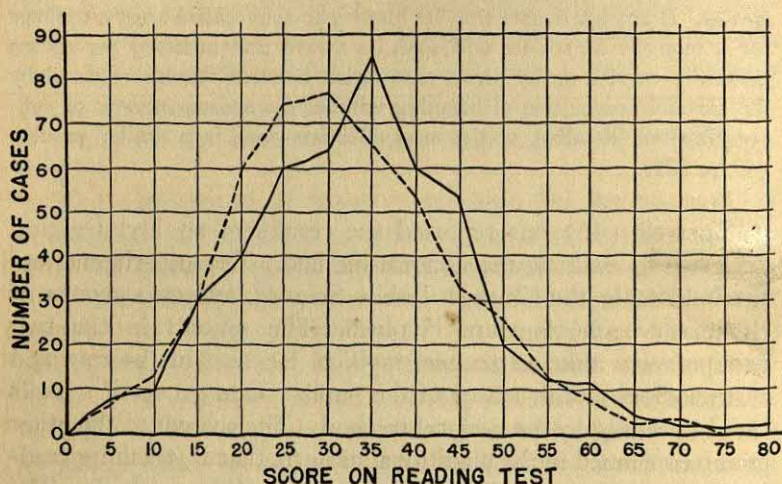
FIG. 33.—Distributions of reading-test scores for oral (broken line) and
nonoral (solid line) groups. From Buswell (48, p. 17), by permission of the
University of Chicago Press.

In seventeen of the thirty-two participating schools, records
were kept of the children who moved their lips or vocalized
while taking the silent reading tests. These results are sum-
marized in Table IX. Of 237 children observed in the nonoral
group, 41 cases, or 17 per cent of the total, manifested lip move-
ment. Of 351 subjects observed in the oral group, 75 cases,
or 21 per cent of the total, were vocalizers. The results for the
oral group are not surprising. The revealing thing is that
almost as many children in proportion were classified as vocal-
izers in the nonoral group. According to the theory commonly
advanced, nonoral reading is supposed to proceed by direct
association between visual symbol and meaning. In that case
there should be no vocalization during silent reading. The least
that can be said from the present results is that it does not
always work out that way. Of this finding and of the results

TABLE IX

INCIDENCE OF LIP MOVEMENT AMONG PUPILS TAUGHT BY ORAL AND
NONORAL METHODS

Group	Number of Pupils Observed	Pupils Showing Lip Movement	
		Number	Per Cent
Oral	351	75	21
Nonoral	237	41	17

From Buswell (48, p. 18), by permission of the University of Chicago Press.

of the study as a whole, Buswell has asserted, "the nonoral method did not eliminate lip-movement in all cases, as by theory it should have done, but its superiority over the customary method was unquestionable" (49, p. 525). This is putting it rather strongly, insofar as the results portrayed on Figure 33 are concerned. It would be doing well to get two distributions to come out as much alike by testing the same group twice.

COMMON ELEMENTS IN ORAL AND SILENT READING

The dilemma which Buswell's results have posed raises a question regarding the primary premise of the nonoral hypothesis. It is possible that oral and silent reading are not as mutually exclusive as some authorities have supposed. In any case, there is another side to the shield, which even the eye-movement evidence brings to light. It is one thing to find that the eye movements in silent and oral reading differ, another to discover relationships between the measures. Studies of such relationships show that oral and silent reading have much in common. Differences between the two types of reading remain, but they may be differences of degree rather than of kind. The best way to develop this thesis is to review the evidence.

Relationship Between Eye Movements in Silent and Oral Reading.—Early studies of the eye movements in oral and silent reading emphasized differences between the two processes. That it is equally possible to find relationships is shown by the

results of an investigation conducted by Anderson and Swanson (13). In this study the eye movements of a group of college freshmen were photographed while the subjects read one passage orally and another selection silently. Correlations were run between the eye-movement results for the two types of reading. The correlations ranged from .50 for pause duration to .68 for fixation frequency and rate of reading. The correlation for regression frequency was .59. As correlations go, these are fairly high. In other words, there was a tendency for the individual who read with efficient eye movements in oral reading to read with efficient eye movements in silent reading, and for the individual who read with inefficient eye movements in oral reading to read with inefficient eye movements in silent reading. These results do not indicate that oral and silent reading are the antithesis of each other, but rather that a relationship exists between the two. Since eye movements are best regarded as the involuntary tools of the mind, the basis for the relationship is probably to be found in the central processes of perception and apprehension. Swanson (310) has made a study of the relationship between silent and oral reading from the standpoint of these cognitive elements.

Relationship Between Word Perception in Silent and Oral Reading.—The subjects of Swanson's study were a group of poor silent readers selected from among college freshmen. The object was to discover whether these poor silent readers were also poor oral readers. They turned out to be extremely poor oral readers, making an average of 34 oral errors on 319 words of material. The error categories, in order of the frequency of occurrence of the errors, were substitutions, repetitions, omissions, insertions, mispronunciations, and miscellaneous. The supposition was that the subjects made similar errors in their silent reading. Errors in silent reading were measured by a tachistoscopic technique. The tachistoscope requires no oral reading, but an error analysis can be made from the written reports of the subjects. In Swanson's experiment, a series of fifty phrases, each two or three words in length, was prepared from the oral reading material. The phrases were exposed for

225 ms. each in a Whipple tachistoscope. An exposure time of 225 ms. approximates the average time of the fixations in the silent reading of normal adults. The subjects reported their perceptions in writing. These reports contained an average of thirty errors. Substitutions constituted the most frequent error, 67 per cent of the total errors being of this category. Errors of omission were next most frequent, 30 per cent of the total errors being of this type. A correlation of .81 was obtained between total oral reading errors and total errors in the tachistoscope. A correlation of .68 was found between the number of substitutions in the two situations, and one of .50 when only omissions were considered. These results indicate a fairly close relationship between oral and silent reading, insofar as perception accuracy in silent reading is adequately measured by the tachistoscopic technique.

Fairbanks (101) repeated part of Swanson's experiment using both a group of good and poor silent readers from a college freshman population as subjects. The object in this experiment was to find whether these good and poor silent readers could be differentiated in terms of number of errors made on a test of oral reading. The good silent readers were found to make significantly fewer oral reading errors than the poor silent readers. In other words, by first selecting a group of good and poor silent readers, Fairbanks identified at the same time individuals who were good and poor oral readers. Rogers (280) has shown that the relationship between oral and silent reading also holds for comprehension. Her study, like Fairbanks', involved extreme groups of good and poor silent readers selected from a college population. With time held constant, she found that the good readers read with 87 per cent accuracy both orally and silently, while the poor readers read with 60 per cent accuracy silently, and with 58 per cent accuracy orally. Similar results were obtained when the amount of material was held constant and when the time was allowed to vary. Rogers' results failed to show that comprehension is significantly better in silent than in oral reading.

In a study conducted at Harvard as a doctoral dissertation, Gilmore (132) obtained a correlation of .92 between oral read-

ing skill and silent comprehension among second-grade pupils. Correlations do not come much higher than that.

SILENT READING AS AN IMPLICIT FORM OF ORAL READING

It is not at all clear from the results of the studies reviewed in the preceding section that oral and silent reading are "the *precise reverse* of each other." The evidence suggests rather that oral and silent reading are significantly related and have many elements in common. An alternative hypothesis, therefore, is that oral and silent reading may be the overt and implicit expressions, respectively, of the same fundamental process.

Implicit Speech During Acts of Verbal Thinking.—It is not impossible that traces of speech normally remain a part of all silent reading. Jacobson (183) has found that implicit speech unquestionably accompanies other acts of verbal thinking, if not reading. Jacobson's discovery was made possible by the use of the action-potential technique. As is well known, all muscular activity involves a change in electrical potential. These changes, even when the muscular contractions are highly implicit, can be detected and recorded by placing electrodes on the body near the muscles concerned and connecting the electrodes with a very sensitive galvanometer. Extreme amplification is necessary in order to detect the changes in electrical potential resulting from implicit movement. The galvanometer Jacobson used was capable of detecting changes in electrical potential as small as a millionth of a volt. All deflections of the galvanometer were recorded photographically. In these experiments on verbal thinking, the electrodes were attached to the lip and tongue muscles and the subjects were instructed to count mentally, or to imagine telling a friend the date, or to think of certain abstract things, such as "eternity," "electrical resistance," "Ohm's law," and so forth. Action currents were recorded under all these conditions. Other tests were made during audible speech, and the pattern of the results was the same. The obvious inference is that verbal thinking is a process of implicit speech, or at least that implicit speech accompanies verbal thinking. The results ought to be the same for silent reading, which

can also be classed as a type of verbal thinking although the proof is not conclusive. What is needed is a similar study designed specifically for silent reading.

Implicit Language Responses of Deaf-Mutes.—Jacobson's results have been supported by Max (215) in his interesting work with deaf-mutes. These subjects perform the speech function with their hands. Any evidence that they engage in implicit hand or arm movement in their thinking would have the same import as Jacobson's results. Max employed the action-potential technique, but used twin circuits, making it possible to record action currents simultaneously from two separate muscle groups. In most of his tests, one pair of electrodes was attached to the right arm and the other pair to the left arm. The main advantage of using deaf-mutes as subjects for an experiment like this is that the hands are so accessible. The speech musculatures of normal persons are relatively inaccessible. Normal subjects, however, provide an excellent control, since they do not speak or think with their hands. The tests of abstract thinking in Max's experiment included adding, multiplying, and dividing mentally, reading, selecting appropriate sentences in multiple-choice tests, and the like. In 86 per cent of these tests, action currents were recorded from the hands of 18 deaf-mutes, whereas the figure for 16 normal controls was only 31 per cent. No significant difference occurred between the groups on certain other tests of imaginal activity, the overt performance of which ordinarily involves the hands of both deaf-mutes and normal persons. The first difference, therefore, was a real one and indicates that deaf-mutes do their abstract thinking primarily with their fingers and hands. Normal subjects mainly use their vocal and articulatory mechanism, although not exclusively. A good test to try on a few friends is to ask them what a *spiral* is. Some will give a verbal answer, but others will simply twirl their fingers in the air and make it clear for you that way. It also appears that some of Max's control subjects must have performed their mental arithmetic with the aid of their fingers, inasmuch as implicit finger and hand movement was detected in 31 per cent of the control tests.

THE CONCEPT OF CUE-REDUCTION

Buswell's finding that there is almost as much evidence of vocalization among children taught by McDade's nonoral method as by methods which incorporate oral reading can probably be explained in terms of just such implicit language behavior as Jacobson and Max have demonstrated in their studies. The presentation of the word, together with a picture, for example, does not automatically rule out speech. Speech manifests itself in the naming of the picture, which is the clue to the word. The child, it is true, may "mouth" or say the word to himself, but implicit though his response may be, it is speech for all that. Speech may thus remain a part of learning to read by the nonoral method as well as by the "look-and-say" method.

Even when a child learns to read by the "look-and-say" procedure, the overt responses of saying the words aloud gradually give way to implicit speech movements. This abbreviation of the speech responses is covered by the concept of cue-reduction, which is one of Hollingworth's (171) favorite notions. Cue-reduction refers to the refinement of a skill and to the elimination of waste motion. In the case of reading, the concept of cue-reduction applies not only to the motor side of the performance but also to the sensory side, in that, with time, fewer cues from the printed page or less of the original pattern of stimulation is required to get the meaning. The efficiency of the eye movements which characterizes skillful silent reading is a function of cue-reduction.

The response of saying the word is not the only response to the visual symbol, and at the start especially, if there were not other responses, much of the meaning would be lost. If the teacher shows the phrases "Clap your hands," "Close the door," and at the same time gives these commands orally and the children obey, and if later, when she shows the cards, the children perform these acts, they may be said to have learned to read. Doubtless the "hearing" child will say these words either aloud or to himself and will *feel* his own vocal response, and later these may become his chief responses (in some abbreviated form), but he will also sense the incipient responses of clapping his

hands and moving (or at least experience a muscular tension) in the direction of the door, and these responses, too, are the *meaning* of the visual symbol.

Again, if the teacher shows an appropriate picture with the words, "Father is at the door," and so says, then the child may experience withdrawing reactions (for fear of the punishment which mother has promised when father gets home) or the joyous experience of running to the door to welcome him, and for the rest of his life the word "father" will arouse some attenuated emotional responses which will, however vaguely, reinstate the gist of his experiences with "father." This is as much a part of reading as the response of speaking the words, although in time the subvocal responses may be the part which is substituted for the whole or "stands for" it in the sense that it "heads up" or summarizes all these previous experiences.

The way in which speech may seize control of the total pattern of response to the word has been neatly demonstrated by Hudgins (178) in his interesting experiments on the conditioning of the involuntary movements of the contraction and dilating of the pupil of the eye. In one experiment, at the same time that a light was suddenly made brighter and the pupil of the subject's eye was seen to be contracting, a buzzer was sounded. After a time the sound of the buzzer caused the pupil to contract, even though the light was unchanged. In a further experiment, the experimenter and the subject both said "contract," the buzzer was sounded, and the intensity of light increased all at the same time. After a large number of repetitions of this combination of stimuli, the saying of the word "contract" by either the experimenter or subject caused the pupil to contract with no sound of buzzer or change in intensity of light. Menzies (224) has described a similar experiment, in which the subject's whispering of the nonsense word "prochaska" was substituted for a cold-water stimulus in bringing about a vasoconstriction of the small arterial blood vessels of the skin. How one's own saying of the word operates these wonders to perform can be explained in terms of the fact that speech is not only a response but also a stimulus. It is a stimulus in the sense that the individual can hear himself talk

and feel himself talk. The feel of talking results from the stimu-
lation of sense organs located in the speech muscles themselves.
These sense organs, which are called "proprioceptors," are
imbedded in the muscles, joints, and tendons. Whenever a
muscle contracts, the proprioceptors located in the muscle are
stimulated by mechanical pressure. Such stimulation forms the
basis of the kinesthetic sense. As Hudgins and Menzies have
demonstrated, the self-stimulation of which speech consists can
serve to condition a response.

In the early stages of reading, the child's response of recog-
nition normally includes the saying of the word aloud or sub-
vocally, and at times the hearing and always the feeling of
saying it (or the awareness of the incipient movements of
speech). This speech stimulation may establish ties with the
total pattern of response to the printed word, after the fashion
of Hudgins and Menzies. In learning to read, the situation is
considerably simplified by the fact that the responses of recogni-
tion are already conditioned by the sound of the word. The
child needs only to hear himself say the word from the printed
symbol to get the same meaning. The feel of saying the word
is part and parcel of the same pattern of speech stimulation,
and shortly it may be all that remains of a speech influence.
Alexander Bain once said that *"Thinking is restrained speaking
and acting."* This is an equally good definition of reading,
although in time the incipient movements of speech may come
to "stand for" or symbolize the whole pattern of responses to
the printed word. There are words for everything, and no
other mechanism is so readily capable as speech of organizing
the enormous variety of response patterns which the interpreta-
tion of the printed page demands.

The habit of vocalization probably depends more on the
individual than on the method of teaching. Most if not all
children go through a stage when they move their lips while
reading silently. Some children grow out of this stage more
rapidly than others, just as some children stop counting on their
fingers sooner than others. In this connection it is of interest
to note that Anderson and Swanson found a closer relationship
between oral and silent reading in the case of poor readers than

in that of good readers. It is doubtful that this finding can be attributed to the idea that the poor readers had been taught to read by an oral method and the good readers by a silent method. Buswell's own results show that the method does not make as much difference as might be expected. Individual differences are bound to occur under any method. The better the reader, the less chance that he will vocalize (the farther removed the silent reading from oral reading). Buswell's results throw light on this point, too. His data show that the pupils who remained vocalizers, whether in the oral or nonoral group, tended to be less intelligent than the average of all his cases. In view of the relationship which exists between reading achievement and intelligence, it is likely that these children also tended to be the less able readers in both groups.

As for overcoming the habit of vocalization, Pintner (260) once proposed that the individual practice reading while repeating a series of digits. Pintner reasoned that if the individual engaged in counting, he could not enunciate the words at the same time. Secor (297) recommended whistling or repeating the alphabet as a means of preventing an articulation of the printed matter. Such methods are unnecessary. The condition for cue-reduction is practice, and there is no substitute for practice. A lot of reading of a wide variety of easy and interesting material will help as much as anything else to reduce the vocal element. Too difficult material tends to make vocalizers of all of us. As a means of drawing attention to a problem and motivating the individual to do something about a skill which he ordinarily neglects, even freakish methods have their place. Otherwise it is a case of practice and more practice. It is hard to better the advice of an early New England settler who offered the following recipe for improving reading ability:

1. Read.
2. Read.
3. Read some more.
4. Read anything.
5. Read about everything.
6. Read enjoyable things.

7. Read things you yourself enjoy.
8. Read, and talk about it.
9. Read very carefully some things.
10. Read on the run, most things.
11. Don't think about reading, but
12. Just read.

In the sense that the response to the printed symbols does not include the saying of the word, "purely visual reading" is possible. Cases of "motor" aphasia (speechlessness due to brain damage) who were able to read have been reported. Woodworth cites one of Head's cases, of whom Head has said, "All power of reading aloud was abolished. . . . There was not the slightest doubt, however, that he understood much of what he read to himself" (363, p. 718). This individual, according to Woodworth's report of the case, could execute simple printed directions. And it is true that deaf-mutes can learn to read. In fact, the easiest vocabulary for the deaf to acquire is the reading vocabulary. However, people who have lost their speech, or who have no speech, or whose speech is imperfect, cannot learn to read as easily as the person with normal speech. In view of this fact, one may question whether it really is an advantage to try to learn to read without so much as even saying the words silently. It would appear that in learning to read, speech is more of a blessing than a curse. The best readers in the first and second grade are generally the pupils who are the most advanced in speech (284). Why bite the hand that feeds one? Recent research findings (76) indicate that a certain aid to meaning or comprehension may be sacrificed by the prevailing efforts in the early grades to suppress inner speech. Saying the words to oneself undoubtedly makes for slower reading but may make for better comprehension. Speech has a dimension, namely, of stress or emphasis which can be only partially indicated in print. It has been found, experimentally, that there is a close relationship between this oral stress and meaning, and that an excellent measure of a reader's comprehension of a passage is the extent to which he can indicate the words which should or should not be stressed were he to read

the passage aloud. As a measure, it correlates as well with the results of standardized tests of reading comprehension as they correlate with one another.

In reading readily comprehended materials, inner speech may well be at a minimum, but in efforts to get the meaning of printed materials, which the reader finds difficult, he should be free to call on the deeper reservoir of meaning of spoken language. Under some such circumstance, who of us adult readers has not found himself *saying* the words to himself? Oral reading *with expression* should not lose its rightful place in the curriculum.

Of course, when auditory and speech handicaps are present, methods must be employed which minimize or neutralize these conditions. Deaf-mutes can only learn to read by so-called silent or sight methods. The finding, however, that deaf-mutes engage in implicit finger and hand movements in their abstract thinking is suggestive in this connection. Apparently, even deaf-mutes fall back on some substitute for speech when it comes to such "mental" activities as reading.

THE RELATION OF MEANING TO ORAL READING ERRORS [2]

The finding that oral and silent reading are related has a practical aspect. As Swanson's results strongly suggest, many of the errors which an individual makes when he reads orally probably also occur when he reads silently. The practical difficulty is that these errors cannot be discovered by means of a silent reading test. The concept that silent reading is an implicit form of oral reading provides an easy solution; that is, we can turn to an oral reading test instead. Oral reading will operate to make errors explicit so that they can be recorded and analyzed. This approach has been widely applied. Errors are recorded by means of a test like Gray's Standardized Oral Reading Paragraphs. Elaborate methods have been developed for classifying the errors into types. Monroe and Backus (232), for example, offer the following error categories: faulty vowels,

[2] This section is adapted by permission of the publisher from an earlier article by one of the present authors (9).

faulty consonants, reversals, addition of sounds, omission of sounds, substitutions, repetitions, addition of words, omission of words, and refusals or words aided. After the errors have been classified according to some such scheme, the usual procedure is to compute the percentage for each type of error from the total error score. The same line of reasoning is then applied to the correction of difficulties. The argument here is that, if the errors are first cleared up in oral reading, they will also vanish from silent reading because of the relationship which exists between the two types of reading. Errors which need attention are identified from an error profile based on the percentage scores, and specific remedies are prescribed for the most troublesome errors. Thus Monroe and Backus recommend tracing and writing methods for errors of reversal, word discrimination drills for additions and omissions of sounds, choral reading for repetitions, insertions, and omissions of words, and so forth. The advantage of the oral approach again is that it is explicit and offers objective evidence for the evaluation of pupil progress. These practices should be looked into from the standpoint of the underlying causes of the errors.

It is true that poor readers make more oral reading errors than good readers, and that the errors have a bearing on silent reading. In his study of the oral reading of good and poor readers at the college freshmen level, for example, Fairbanks (101) found that the poor readers made an average of 5.8 oral errors per 100 words, and the good readers an average of only 2.1 errors per 100 words on the same material. However, there is another difference which is even more important; namely, the mistakes which poor readers make tend to change the meaning, while the errors of good readers do not alter the sense. This is another fact that was brought out in Fairbanks' study. Substitutions of words were found to be the most frequent type of error for both the good and poor readers, but there was a great difference in the seriousness of the errors. Thus while 51 per cent of the substitutions made by the poor readers seriously changed the meaning, not one of the good readers' substitutions was of that type. Furthermore, good readers correct their errors more often than do poor readers. In this connection

Fairbanks found that the poor readers in his study corrected only 7 per cent of their errors, while the good readers corrected 19 per cent. In other words, poor readers are often unaware that their mistakes change the meaning. It follows that they are probably not getting the meaning to begin with. Otherwise they would sense that something was wrong and correct their mistakes. It seems doubtful, therefore, that the errors constitute the real problem. It appears, rather, that the crux of the matter is related to the question of comprehension. If material is used which the pupil can read with understanding, oral errors will largely disappear as a problem.

Yet the method usually employed to help children with their reading remains directed at the oral errors themselves. As we have noted earlier, some of the poorest teaching at times passes for remedial reading. It consists of sitting down with the child, listening to him read orally, stopping him when he makes a mistake, and asking him to try it over but to get it right this time. Here is a typical scene, complete with sound effects: "All right, start here," says the teacher, getting the lesson under way. The child reads a word or two and then makes a mistake. No sooner does he make his first mistake than the teacher exclaims, "Uh-uh! Look at that word again. What did you say it was?" The child looks and discovers the error of his ways. "All right, that's better," nods the teacher. "Now, start over, and read it that way this time." Another word or two, and another mistake. "Uh-uh, there you go again!" interjects the teacher as before. "You'll just have to learn to look at these words more carefully. Now, what was it?" The child, subdued, calls the word correctly on his next attempt. He is then told to start from the beginning again, and to get *all* the words right this time. The rest of the script can be filled in from imagination. The process is one of constant interruption. The child cannot keep the train of thought intact under these conditions. The process operates only to make the child hyperconscious of individual words, and the real purpose of reading, which is to get the meaning, is destroyed. The teacher would do better to supply the words outright. There is nothing wrong with telling children what words are. A word to the wise now

and then saves unnecessary interruption and urges the thought along. Furthermore, one of the ways that children learn to recognize words in the first place is by being told what they are.

The practices described above are a survival from days when methods of teaching reading were mainly if not exclusively oral. The accuracy and the expression with which children read aloud were at one time virtually the only means used for gauging progress in reading. In many schools, the reading period still consists chiefly of the pupils' taking turns reading orally. This practice is aided and abetted by many parents who believe that children should have a whirl at oral reading each day in school. Oral reading is the means that they use at home to check up on their own children, and, incidentally, to check up on the school. Letter-perfect oral reading is often a false guide. In their endeavor to read without error, the children may become so preoccupied with the articulation of the words that they lose sight of the meaning altogether. No child is a better oral reader because he does not get the meaning, but oral reading does tend to divide attention between the mechanical process of articulating the words and the thought process of getting the meaning. The former can go on without the latter. One child, when asked to state the substance of a passage which he had read aloud to perfection, lamely replied, "I didn't know I was supposed to." In other words, even when the child recites his piece perfectly, we cannot always be sure that he is taking in the meaning. One wonders what purpose is achieved in that case.

The intelligent way to solve these reading problems is to place the emphasis on meaning. This is largely a matter of using material which is easy enough for the child and encouraging him to read it for meaning. Errors will still occur, but what if the child does omit a word now and then, add one here and there, reverse the position of a few words, or even occasionally substitute words, so long as the meaning remains unchanged? Most authorities agree that errors which do not change the meaning can be safely ignored. Many errors of that type result from filling-in from the context; that is, the child understands so well what is coming next that he does not even bother to check the words but reads the rest of the sentence in his own

way. Calling attention to each error in this case would amount
to sheer meddling. The whole object of using material which
is easy enough for the child is to make it possible for him to
profit by the context. It is mainly important in this connection
that the child reads enough of the words correctly that he can
supply the rest from the context. The power of context to
suggest words was vividly brought to the writer's attention
recently in the case of a boy who has had a long history of
reading disability. This boy is nineteen years old and has a
perfectly good mind, but to this day he cannot read primer
material with security. He is interested in athletics and is a
good performer in a number of sports. The writer had an
extra ticket to one of the Michigan football games and offered
it to the boy, partly in payment for a guest performance which
he had put on before one of the writer's classes. A doubt arose,
however, as to whether the young man could locate his seat in
the stadium from the information on the ticket. Before the
ticket was turned over to him, therefore, he was put to the test.
He identified the section, row, and seat numbers without diffi-
culty. He read the date of the game correctly, identified the
kickoff time, and recognized the names of the contending teams
—word recognition which he had never equaled before. The
power of suggestion of the ticket did the trick. It is a great
advantage to have printed context so strongly suggestive of
words.

The writer has often felt that he would like to try teaching
reading, especially in the upper grades, by surrounding the
children with a wide variety of reading material, permitting
each pupil to select a book according to his own interest and
ability, and then just letting the children sit back and read.
This approach would free the teacher to circulate among the
group, giving individual help as needed. There are teachers
who are already employing this method successfully. It would
be an interesting experiment for other teachers to try out. A
good book is like good music—the child needs a certain amount
of freedom from distraction to enjoy it. Of course, if the child
is not up to reading even the easiest of material, something else
must be tried. However, there would still be no justification

for hacking material to bits. Even the first words can be taught in a meaningful setting, but that's something that we shall look into later.

Rapprochement Between Oral and Silent Methods

The relationship between oral and silent reading is not perfect, and one factor which may operate to reduce the relationship is the method of teaching. Oral reading can be overdone, and it is a good guess that, if pupils receive nothing but a diet of oral reading, they will become better oral than silent readers. It is perhaps a joker in Buswell's experiment that he did not have a group of children who had been taught by a method which was as extremely oral as the method employed with the experimental group was purely silent. A comparison of the performance of such groups on the silent reading tests might well have changed the complexion of the experiment.

Much the same argument applies when the bill of fare is confined to silent reading. In this instance the children should become better silent than oral readers. They get the meaning from context clues and from the pictures in the book, but they have difficulty reading the material orally so that it makes sense. It would have been interesting to compare the oral reading ability of Buswell's two groups, but oral reading was not included in an evaluation of the methods used. It is a reasonable conjecture that a test of oral reading would have reversed the picture for silent reading, especially if the test had been given during the primary period. Children who have been taught to read chiefly by silent means are prone, during this stage, to read inaccurately both orally and silently, although they may often read very fast silently. Pupils who are low in comprehension and high in rate of reading should stress accuracy through oral reading. Oral reading slows the pupil down and promotes accuracy. Children who suffer speech defects also do not as a rule read as well orally as silently. Care should be taken not to force children who have speech defects to read orally before the class. Such children are likely to be emotionally disturbed by audience reactions to their speech, and serious

personality problems may result. Children with speech defects need much the same methods as the acoustically handicapped child (29).

One extreme method is as unnecessary as the other, and most teachers of primary reading use a combination of oral and silent methods which probably helps to account for the relationship which has usually been found between oral and silent reading. The beginning is most often made by oral means. In one survey (22) of the practices of 288 successful teachers of beginning reading, every teacher in the group reported using oral reading in the first grade. Oral reading, moreover, received the chief attention of these first-grade teachers. The advantage of the oral approach is, of course, that the spoken word already carries meaning for the child. The whole object of learning to read is to get the same meaning from the printed symbols. Ruling out the oral cue, as McDade has done, does not jibe with the normal course of language development, which is from the oral to the silent. For this reason, Judd (190) and others have described the oral approach as the natural one.

Meaning ultimately rests on the experiences which the children have had. The job of the school is to make these experiences "verbal," first by talking and then by reading. One reason why children have difficulty learning to read is that they have not had necessary experiences and that their "verbal" level is low. Teachers will, therefore, from the moment their new charges enter school, expect to "talk things over with them." They will expect to listen to what the children have to say, even before they expect the children to listen to them. They can thus find out what the youngsters are interested in; what sort of experiences they have had or haven't had; something of what they understand or don't understand; what things have meaning for them, etc. They can then capitalize on these interests and experiences in their later efforts at associating the printed words with the spoken word until the one acquires the same meaning as the other—and thus the first steps on the road to reading have been taken. Pictures, however, will constantly be used to reenforce the response to the spoken word. Action sentences and dramatizations are always good, as giving meaning to the

printed symbols. Oral discussions preceding the reading lesson, as in McDade's method, are an excellent means of preparing the child for the vocabulary of a story. These discussions should introduce words and expressions which appear in the story. Later, when the pupils turn to the story, these words and phrases will still be "ringing in their ears," which should make the reading of the story just that much easier and meaningful.

After the first grade, silent reading should receive an increasing amount of attention. Silent reading naturally follows from oral reading and in most cases the transition from oral to silent reading presents no problem. The mechanism of cue-reduction takes care of the matter, and the pupils tend to drop out the voice of their own accord. After the children have learned to read on their own, which is the ultimate objective, most of their reading will be silent. Oral reading at this stage should always be preceded by silent study and it should involve a natural audience situation. Dialogues and simple plays provide excellent material for oral reading, and McGann (218) has demonstrated the value of such materials in remedial reading.

The contention that teaching silent reading through an oral approach makes for inefficient eye movements and the habit of vocalization has not been convincingly demonstrated in the literature. As we have already reported, Buswell's study of the nonoral method revealed that lip movement was almost as common among his experimental cases as among his control cases. In an earlier investigation, Buswell (46) showed that in the first grade the eye movements in silent reading are no more efficient than the eye movements in oral reading. During the first grade, whatever the method of instruction, the response of the pupil to the printed symbol is chiefly oral, whether he is reading to himself or reading aloud, and his rate of silent reading is accordingly no more rapid than that of his oral reading. Gray (139) and Judd (190) demonstrated that the rate of articulation increases rapidly until roughly the fourth grade, and then begins to level off. Meanwhile the child's rate of reading usually overtakes his rate of talking. After the child learns to read as fast as he ordinarily talks, oral reading should be

definitely curtailed and the scales tipped far in favor of silent reading.

SUMMARY

Learning to read, then, is an aspect of total language development. The child first learns to respond to the speech of others. He next learns to speak himself. Then he learns to read. Learning to talk subserves learning to read. Finally, the child learns to write and spell. Writing and spelling lag behind reading in the language sequence. The process of learning to read is a case of associative learning. The association is that between the sight of the word and the child's response to the sound of it, although the same results may be obtained from an association of the visual symbol with the response to a picture. Teaching a child to read consists essentially in setting the conditions for the formation of these associations. Two methods for meeting these conditions have been described, the "look-and-say" method and the so-called silent or sight method. Except possibly for such a "completely nonoral" method as McDade's, the general practice is to use a combination of both methods, which for convenience we may characterize as "word" methods. What we have built up to so far *is* the word method. This, however, does not end the story of learning to read. The object in this chapter has been merely to describe what is the essence or main business at the *start* of learning to read. Learning to read at the start *is* a matter of learning to recognize most of the words, but reading is also a process of getting ideas from printed matter. Sometimes all the words may be familiar, but no meaning results. This problem has often been attributed to the idea that too much attention was given to individual words early in the grades. Obviously we cannot settle for the word method alone. Other methods exist. All should have an equal hearing. Some attention should be given to phrases. The dangers of word-for-word reading must be met. There are other complications which we shall elucidate as the discussion proceeds.

Chapter 5

THE PSYCHOLOGY OF WORD PERCEPTION

INTRODUCTION

In a study of the practices which were employed in the Navy to select radar operators during the last war, a sailor aboard a shore establishment was asked how he had earned his living before entering the Navy. He replied that he had been a rodeo performer out West. When queried further regarding this curious discrepancy between his naval assignment and civilian occupation, the only explanation that the young man could offer is that some classification officer in looking over his record must have misread "rodeo" as "radio" and so had tagged him as a likely candidate for radar operator training. Apocryphal or not, this story serves to introduce the question which will be discussed in this chapter: What visual cues are involved in word perception? The last chapter was concerned mainly with the motor side of reading. Without response, there is no meaning. Words are not perceived directly from the visual symbols themselves. Stimuli have no meaning except by way of the responses they provoke. It is doubtful, for example, that the meaning of a stimulus like the screeching of brakes on the street corner outside is aroused directly by the sound itself. A more likely hypothesis is that the meaning is bound up with the responses which the sound calls forth. Bell-fashion, it might cause the viscera to turn somersaults, the body to brace against the impending shock, the breath to catch, and so forth. In other words, the individual tends to react much as if he were out there in the automobile himself, implicit though his response may be. It is an example of what psychologists call "empathy." Empathy refers to the process by which an individual identifies

with or feels himself a part of another person's situation. The process of empathy explains how one can "take in" a situation without actually being a party to the affair. It is a case of being present in mind but not in body. Mind here is used in Guthrie's sense, who identifies it with "the capacity for associative learning" (146, p. 16). Holt argued that the empathic response is "the very basis of 'perception'" (173, p. 113). The meaning of language symbols is similarly aroused by way of the responses which have become associated with them in the past. The pages of a book are brought to life largely through the reader's capacity to identify with the word picture which the author has drawn. However, it is also possible to study the process of word perception from the standpoint of the conditioner of the response. How is the response of recognition released by the word as seen? A study of this question will set the stage for a complete discussion of methods of teaching reading which will follow in the next chapter.

CUES IN WORD PERCEPTION

The visual cues which are used in reading have usually been investigated by means of a tachistoscope or short-exposure device. A tachistoscope is neatly suited to this purpose, for in reading, the eyes themselves function like a tachistoscope. As explained before, the eyes do not move across the line in a continuous sweep—they proceed rather in a quick series of stop-and-go movements. The material is perceived only during the pauses of the eyes. These pauses are very brief, averaging only about 250 ms. in the normal reading of adult subjects. A tachistoscope permits much the same sort of exposure to material. Words, phrases, or sentences may be used as test material, and the exposure time can be so controlled as to limit the subject to one fixation per trial. Under those conditions, a tachistoscope simulates what the eyes might see during one fixation in normal reading.

When words are exposed in a tachistoscope for a small fraction of a second, they are often misread or confused with other words. Records of these misreadings reveal that the words

confused almost always have some feature or component in common. One may infer from such evidence that whatever marks the similarity between the words served as the cue. This method of analysis has been widely used as a means for identifying cues in word perception. In some experiments, the test words have been deliberately mutilated by omitting, adding, substituting, or transposing letters, by blurring parts of the word, or by devising false words. The subject is usually able to conjure up a word from what he sees, and the cues are teased out by identifying the elements or characteristics of the test word which are retained in the word reported. Failure to report any word may mean that the vital cue has already been destroyed, which is as good as identifying the cue.

Experiments have demonstrated the existence of three main types of cues: (1) individual letters, (2) small letter groups, and (3) word shape or form. The evidence for this classification of cues is reviewed below.

Individual Letters as Cues in Word Perception.—According to some workers, individual letters constitute the most important cues in word perception. In past work, the cue value of individual letters has been closely identified with their relative legibility. The argument which has been advanced in this connection is that the most legible letters stand out and so capture the reader's attention and control his response to the word. From this standpoint, the letters which have been assigned the highest cue value include the first and last letters of the word, the few letters which fall directly on the fixation point or area of clearest vision, the capital letters, and the ascenders and descenders, which are the high and low letters like b, d, p, and q.

Dominant Letters. The high and low letters, together with the capitals, were called "dominant letters" by Zeitler (368). In experiments with a tachistoscope, he obtained many instances of misreadings in which the letters extending above and below the line, and the capital letters, were reported correctly. Hence he concluded that these letters must have dominated or controlled the subject's perception of the word. Woodworth (363,

p. 741) offers the following examples of what Zeitler had in mind.

Exposed	Read
Epaminondas	Epimenides
Kandelaber	Kanadabalsam
Praeglacial	Portugal
Agoraphobie	Agraphie
Hallneiuotiou	Hallucination
Meludie	Medulla
Trnuhxnckt	Trunksucht

In all these examples, the capitals are reported correctly, and most of the ascenders and descenders of the original words are retained in the reported words. Since these high and low letters sometimes occupied positions in the reported words that differed from those in the test words, Zeitler believed that they were seen as actual letters and not as mere projections in the word shape. He did not attribute much importance to word shape, but subscribed to the view that words are perceived by constructing the words from the letters. As Woodworth remarks, however, the evidence is not conclusive because the word shape is well preserved in most of the above misreadings. Messmer (226) also found that misreadings in a tachistoscope often retain the letters extending above and below the line, and he agreed with Zeitler's notion of "dominant letters."

Determining Letters. Further evidence of the importance of individual letters in word perception was obtained by Goldscheider and Müller (133). The letters which these workers found to be especially useful were the initial letter of the word, the ascenders and descenders, and the vowels. These were named "determining letters." The rest of the letters in the word were called "indifferent letters." The basis for this classification of letters consisted of the finding that misreadings in a tachistoscope are more likely to occur when the "determining letters" are left out than when the "indifferent letters" are omitted. Recognition is difficult from the "indifferent word-form" which remains when the "determining letters" are missing, but at the same time Goldscheider and Müller agreed with

Zeitler that the primary function of these letters was not to preserve word shape as a cue. They thought, rather, that the sight of the "determining letters" served to arouse their sounds or even to bring about a pronunciation of their sounds, which in turn might suggest the sound or pronunciation of the whole word. Goldscheider and Müller did not deny that reading by word shape was possible, but they insisted only that it was not the rule.

The Legibility of Letters in Nonsense Words. Whether certain letters stand out over others except as they characterize the word shape nevertheless remains a matter to be settled. One way to deal with this problem is to measure the legibility of letters in nonsense words. Generally speaking, nonsense words have no familiar pattern. The use of nonsense words, therefore, should largely rule out the influence of word shape as a cue. Are certain letters still seen more clearly than others? Of experiments directed at this question, the one of Crosland and Johnson (64) deserves special mention. These workers devised a set of exposure cards which they presented to thirty university students and instructors by means of a Dodge mirror-tachistoscope. The exposure time per card was 150 ms., and each card contained a nonsense arrangement of letters of the alphabet. All letters were used an equal number of times throughout the series of cards, and the nonsense words used varied in length from three to ten letters. The position of each letter in the word was determined by chance. The subjects were instructed to report the letters they grasped from each exposure by the positions the letters occupied in the word. A maximum score of 300 was possible for each letter. The total number of times each letter was reported correctly by proper position is shown in rank order below.

These results do not permit any sweeping generalizations regarding the relative legibility of different types of letters. The ascenders and descenders, which Zeitler included among his "dominant letters" and Goldscheider and Müller among their "determining letters," are rather evenly distributed throughout the list. There were seven ascenders and descenders among the

Letter	Score	Letter	Score
y	174	s	117
i	162	r	113
j	160	h	112
d	157	k	111
1	153	x	109
e	149	b	106
f	148	c	104
u	144	z	99
g	130	p	97
t	130	a	70
w	129	v	68
o	128	q	58
m	124	n	50

thirteen most frequently reported letters, and five among the thirteen least frequently reported. The belief of Goldscheider and Müller that the vowels also have a "determining" quality fared only slightly better. The vowels, excluding the sometimes "y," which is also a descender, were divided four to one between the thirteen highest and lowest letters, but only the "i" was conspicuously high on the list. The rest of the vowels faded rapidly in the showing. However, it can be pointed out that the first ten letters were either ascenders, descenders, or vowels, which is more than can be said for the last ten letters. Goldscheider and Müller and Zeitler deserve the benefit of the doubt. It is of some interest to note that "p" and "q," both descenders, were near the bottom of the list, possibly because these letters can be easily confused as to direction. This difficulty is epitomized in the adage, "Mind your p's and q's."

The Legibility of the First and Last Letters of the Word. One fact which experiments on the recall of letters from nonsense words have repeatedly demonstrated is that the first and last letters are reported correctly more often than the letters which are squeezed in between the ends. Wagner (349), for example, obtained the results shown on Figure 34. In this experiment, series consisting of eight unrelated letters were exposed in a tachistoscope for 100 ms. The fixation point fell

directly on the center of the word, and the subjects were instructed to report as many letters as they were able to recall from each exposure. The figure shows the percentage of letters which was correctly recalled at each position of the word. It
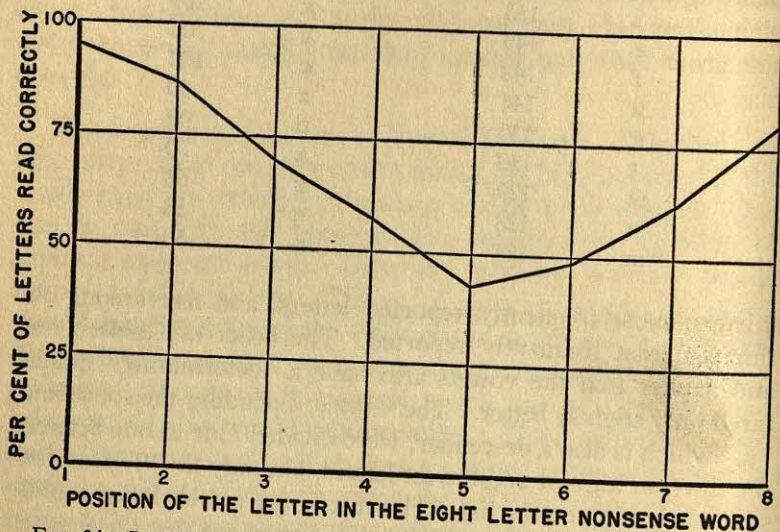
FIG. 34.—Letter-position scores in recall of letters from nonsense words. From *Experimental Psychology*, p. 742, by Robert S. Woodworth. By permission of Henry Holt and Co., Inc., 1938.

is clear that the letters which had the highest recall value were those at the beginning and end. The letters which fell closest to the fixation point were least often reported correctly. The area of clearest vision and of clearest attention obviously need not coincide.

Woodworth (363, p. 720) has demonstrated the reason for these facts in the following way. He asks the reader to hold his fixation on the central "o" in each of the lines below, and then to try reading the letters on each side. The single "t" and "s" stand out clearly and can be recognized without difficulty.

t	o	s
nte	o	hsx

The same letters tend to lose their identity when viewed in the collections of the second line. This vanishing act can be attributed to mutual interference or masking of letters in indirect vision. The inside letters of a series suffer most from this masking effect, the end letters the least. As Woodworth explains, the end letters have the advantage of being free on one side from the interference of adjacent letters. This assertion may be tested by another demonstration which Woodworth (363, p. 720) has devised. In the following letter groups, the central "o" should again always be fixated. Which letters stand out in each series? This experiment is difficult because the eyes have a tendency to shift inadvertently to the letter which stands out most clearly at any instant. Woodworth suggests that someone watch the reader's eye to call attention to these momentary changes in fixation.

<div align="center">

o

bom

sbomk

asbomku

easbomkut

geasbomkutc

wgeasbomkutcz

dwgeasbomkutczh

idwgeasbomkutczhv

xidwgeasbomkutczhvp

fxidwgeasbomkutczhvpn

rfxidwgeasbomkutczhvpnj

yrfxidwgeasbomkutczhvpnjl

</div>

Another condition which favors the first letter is that the mind has been trained to notice word beginnings. For this reason, the legibility of the first letter is likely to be even more pronounced than that of the last letter. Pillsbury found that misprints introduced into words exposed in a tachistoscope were most often detected at the beginning of the word. He declared that his results indicated "a general tendency of the subject to *read through the word from left to right,* and thus to give the

first letters of the word a more prominent part in the recognition of the word as a whole" (259, p. 350). For anyone trained in the English language, the attention, if not the eye, tends to favor the left side of the visual field. We shall amplify this point in the next chapter.

The Cue Value of Capital Letters. The capitals attract notice on account of their size. Cast an eye at the nonsense word below. Which letter stands out?

ncrsMxuae

the cue value of the capitals may be demonstrated by leaving them out of printed matter this is a parody on the style that james joyce used to portray the stream of consciousness in his ulysses perhaps even more disturbing than the lack of capitals is the absence of punctuation marks the latter also have definite cue value in ordinary reading

The Legibility of Letters in Isolation. Much of the work on the legibility of letters has consisted of presenting the characters, not in words but in isolation. Measurements of this general type were first made by the French oculist Javal (185) and by Cattell (55). Javal tested legibility by the distance at which the letters could be recognized, while Cattell employed the short-exposure method. In Cattell's experiment, the letters were exposed in mixed order in a tachistoscope for 0.001 second. The whole series was run through several times, and legibility scores were computed in terms of the number of correct recognitions per letter. On the basis of his results, Cattell arranged the letters in the following order of legibility:

d k m q h b p w u l j t v z r o f n a x y e i g c s

The letters have also been arranged in order of legibility by Sanford (291), who used Cattell's method in one series of tests and the distance method in another series of measurements. The order of legibility which Sanford established by Cattell's method was as follows:

m w d q v y j p k f b l i g h r x t o u a n e s c z

When the distance method is used, the letters are first presented at a distance at which they cannot be recognized and are then brought closer, step by step, until a point is reached at which they can be read correctly. The legibility of each letter is measured in terms of the distance at which it can be recognized. Sanford obtained the following order of legibility by this method:

w m q p v y j f h r d g k b x l n u a t i z o c s e

Despite differences in the precise order of the letters, the results which Sanford obtained by the two methods are in substantial agreement when taken as a whole. The results reported by Cattell for the short-exposure method, and those found by Sanford for this method, do not agree as closely as one might expect, possibly because a different font of type was used in the two studies. Certain broad agreements are nevertheless apparent throughout the three lists. In each case there are nine ascenders and descenders among the thirteen most legible letters. The preponderance of the vowels falls among the thirteen least legible letters in each series. These general results are consistent with Crosland and Johnson's findings for the ascenders and descenders but not for the vowels. The failure of these results to jibe for the vowels can be related to the fact that Crosland and Johnson measured the legibility of the letters in nonsense words rather than in isolation. The vowels have no special attraction of their own. Their chief function is to make the rest of the word pronounceable, and they are likely to be perceived only as parts of certain pronounceable combinations of letters. The vowels can make their presence felt on this basis, even in nonsense words. Thus Zeitler found that the tachistoscopic span for consonants alone was four to seven, but five to eight for consonants and vowels interspersed. Heimann and Thorner (156) and Thorner (324) also demonstrated that pronounceable combinations of letters could be grasped more readily than nonpronounceable arrangements. The vowels require the company of other letters in order to gain high scores in experiments with a tachistoscope.

The Legibility of Letters in Indirect Vision. Another test of legibility is to present the letters in indirect vision. The number of letters which fall on the fovea (the area of clearest vision on the retina) during one fixation in normal reading is rather limited. At the usual reading distance of fourteen inches, only about four or five medium-sized letters can be seen with maximum clearness. Some use must be made of indirect vision. Ruediger (286) conducted an investigation designed to discover how far from the fovea a letter could be recognized. His procedure consisted of presenting the letter "u" or "n" in a tachistoscope to the right or left of the fixation point. The exposure time was 50 ms., the fixation point was 30 cm. from the subject's eyes, and the letters were printed in 11-point type. Under these conditions, Ruediger found that at a distance of one inch to the side of the fixation point the accuracy of recognition was still quite good. This distance would encompass from twelve to fifteen letters of average size. The larger the letter, of course, the farther out it can be seen. Thus in a study in which the perimeter technique was employed, Korte (198) found that capital letters are more legible in indirect vision than the small or lower-case letters. Some of the small letters, in turn, were found to be more legible than others. The letter "w," for example, was recognized twice as far out as the letter "c." It is worth noting that Crosland and Johnson, Cattell, and Sanford also found that "w" is a more legible letter than "c." Another finding of interest from Korte's study is that isolated letters can be read farther in the tail of the eye than whole words, and the longer the word, the closer it must be brought to the fixation point to be perceived. These results can be related to the masking effect which occurs in indirect vision when letters are seen in groups. The configuration of the word may still be sensed, but it is difficult to recognize the word from a vague impression of its outline alone. Thus, Korte attached little importance to the "total optical form." He concurred with Zeitler and with Goldscheider and Müller that the recognition of the word follows from an identification of its constituent elements.

To sum up: We can agree that a clear view of at least some of the letters of the word is necessary before it can be recognized with confidence. It is also possible that, because of differences in legibility, certain letters are more likely to be seen than others. The ascenders and descenders extend above and below the line and attract notice for that reason. The first and last letters enjoy the advantage of being free on one side from the masking effect of adjoining letters. The capitals are larger than ordinary letters and rise above the common herd on that basis. The vowels help to make the word pronounceable and exert an influence in that way.

The letters add up to the word, and the word can be reconstructed if enough of the letters are clearly seen. As Huey noted, however, a letter, the legibility of which is poor in isolation, "may sometimes contribute most to the legibility of the total word form" (180, p. 413). This observation implies that the word shape may have something to say about which letters stand out, and that the "dominance" of a letter is not entirely a matter of its legibility alone. The belief of Hamilton (149) that letters which are "dominant" in isolation may lose their "dominance" when combined with other but nondominant letters carries the same implication. How much cue value can be attributed to individual letters apart from the total pattern is a question which this discussion has not yet satisfactorily answered. It is obvious that we need more information about the nature of word shape itself as a cue in word perception. The next section presents this information.

Word Shape as a Cue in Word Perception.—Erdmann and Dodge (98) identified word shape or form with the outline or configuration of the word. In normal reading, of course, more than just the external outline or pattern is involved. The internal pattern also exerts an influence. Woodworth (363, p. 739) calls attention to the "gridiron effect" created by an accumulation of letters with vertical strokes like "i," "m," "n," and "u," and to the "lively effect" produced by a sequence of curved letters like "c," "e," "s," and "o." Messmer (226)

believed that words are more readily perceived when they contain a mixture of vertical and curved letters than when they consist chiefly of only one of these types of letters. The following words demonstrate the effect of the internal pattern on word discrimination:

> succinct
> surmount
> sarcenet

These words are nearly identical in external pattern, but they are not likely to be mistaken for one another on that account. There are important differences in the detail of the internal pattern. Perhaps the cue with which we are here concerned can best be described as the total word structure. Reading by the total word structure is illustrated by the list of mutilated words shown on Figure 35. What are the words?

Some of these words require more careful study than others, but it should be unnecessary to look twice at most of them.[1] In the majority of cases, enough of a familiar pattern remains to suggest the right word almost at once. The completion of these words from the total pattern is an example of the *closure* phenomenon. The concept of closure refers to the tendency of incomplete figures to complete themselves, once the total figure is sensed as a unit. The Gestalt psychologists attach considerable theoretical importance to the closure experience, and nowadays it is fashionable in psychological circles to speak of the word-Gestalt. Gestalt psychology originated in Germany, and Gestalt is the German term for "shape" or "form."

The Relation of the Clearly Seen Letters to the Total Word Structure. In a study reported in 1898, Erdmann and Dodge (98) found that a word could be read at a distance at which its letters could not be seen. This early discovery is often cited as evidence of the cue value of word shape. Wiegand (355) has reported another study along the same line. The technique employed by Wiegand was an interesting one. A series of tachistoscopic exposures was first presented at a distance at

[1] The words in order of occurrence are: bread, artist, pistol, pickles, sweater, window, blanket, highway, college, chicken, picture, rabbit, radio.

Write the words on the lines. Return later to those you find difficult.

bread_____

artist_____

pistol_____

pickles_____

sweater_____

window_____

basket_____

harmony_____

college_____

observe_____

picture_____

author_____

radio_____

Fig. 35.—Mutilated words illustrating reading by the total word structure. These words are reproduced by permission from a test constructed by L. L. Thurstone.

which none of the letters of the word could be seen. The tachistoscope was then gradually brought closer to the subject until a point was reached at which he could read all the letters of the word correctly. Wiegand found that words exposed at the farthest test distance were reported as mere wisps of gray. The closer the tachistoscope was brought to the subject, the more of the word could he report. The projections of the high and low letters were the first to emerge. It was next possible to identify individual letters. The letters which were first recognized were usually at the beginning and end of a word. The letters hidden in the middle of the word were in general the last to appear. A word might suggest itself at any stage of this process, and it might be either right or wrong. In a similar investigation, Kutzner (201) found that misreadings at a far distance preserved the approximate length of the test word and also retained the approximate number of ascenders and descenders of the original word. He reasoned, therefore, that the word length and the relative number and position of ascenders and descenders in the word must be the cues by which words are recognized. Kutzner placed particular emphasis on the ascenders and descenders. He believed that they gave the word its distinctive character or "form quality." Thus, one subject in Kutzner's experiment misread the word "Vordergrund" as "Vagabund" because it seemed to contain the constellation "V–ı–l––l." In referring to this example, Vernon (346, p. 115) notes that the subject reported the word correctly on the next trial, now presumably on the basis of the constellation "V––l––ı–––l." In still another study of misreadings at a far distance, Grossart (145) found that one projecting letter is often substituted for another. The fact that the projecting letters occupy about the same position in the word reported as in the word exposed may be taken as further evidence of the influence of word shape on word perception. The nature of this evidence is illustrated in the following misreadings which are taken from Woodworth's account (363, p. 741) of Grossart's work:

| Exposed: | ehelos | ausrufen | Lebenslust | fundieren |
| Read: | stehen | zuvordem | Lauterkeit | Interesse |

Woodworth feels that results such as these prove little concerning the importance of word shape in normal reading. He points out that in normal reading the stimulus is quite different. Instead of seeing the word at a distance at which none of the letters can be discerned, the reader views the word at a near distance and is thus in a position to see all the letters clearly. Woodworth suggests that word shape may cease to function as a cue under these conditions. This statement applies only to the concept of word shape which is confined to the bare outline of the word. The total word structure, which includes details of the internal pattern, may still function as a cue. The mutilated words test exhibited above remains a good example. The words which come most readily to mind in this test are not recognized primarily in terms of the clearness of the letters. The word is suggested rather by the pattern as a whole, and the letters are seen as parts of the total pattern. In fact, without the pattern in mind, it would be hard to tell what some of the letters in many of these words are. The pattern is clearer than the letters. In other cases most of the letters are clear enough, but the pattern fails as a cue. One must then perforce fall back on the letters, but this process is inefficient as compared with the case in which the pattern succeeds as a cue.

ThE tOtAl WoRd StRuCtUre cOnTiNuEs To FuNcTiOn As A cUe WhEtHeR aLl Of ThE lEtTeRs ArE lEgIbLe Or NoT. iF iT wErE jUsT a MaTtEr Of ThE nUmBeR oF lEtTeRs WhIcH tHe ReAdEr Is AbLe To AsCeRtAiN, mAtErIal pReSeNtEd In ThIs FaShIoN sHoUlD bE aS eAsY tO rEaD aS mAtErIal pRiNtEd In ThE cUsToMaRy MaNnEr. The lEtTeRs ArE hErE fOr AlL tO sEe, BuT tHe WoRdS tHeMsElVeS aRe NoT aLwAyS iMmEdIaTeLy ApPaReNt. ThE rEaSoN iS tHaT tHe WoRd ShApE oR sTrUcTuRe HaS bEeN lArGeLy DeStRoYeD aS a CuE. tHe InFlUeNcE oF tHe PaTtErn iS dEmOnStRaTeD fRoM aNoThEr AnGlE iN tHe FoLlOwInG tEsT. tHe SeCrEt Of SuCcEsS hErE iS tHe AbIlItY tO dIsCeRn ThE pAtTeRn.

Onenightahungryindianwentoahotelandaskedforsupper. Hehadno moneyandthehotelkeeperrefusedtogivehimfood.   Agentlemanwho

wassittingnearbyofferedtopaythebill.   TheIndianpromisedtorepay
hiskindnesssomeday.   Severalyearslaterthegentlemanandthehotel
keeperwerecapturedbysomeIndians.   OneoftheIndianssetthegentle-
manfreebutleftthehotelkeepertohisfate.   WhodoyouthinkthisIndian
was? [2]

MATERIAL PRINTED IN ALL CAPITALS IS NOT
AS EASY TO READ AS MATERIAL PRINTED IN
LOWER-CASE TYPE. THE USE OF CAPITALS MOD-
IFIES THE WORD SHAPE. A DIFFERENT PICTURE
IS PRESENTED, AND THE PATTERN LOSES SOME
OF ITS CUE VALUE. THE EFFECT IS TO RETARD
RATE. TINKER AND PATERSON (337) FOUND A
DIFFERENCE IN SPEED OF 13.4 PER CENT IN FA-
VOR OF SMALL LETTERS. ONE MAY ASK WHY
THE DIFFERENCE WAS NO LARGER. THE AN-
SWER IS THAT CAPITAL LETTERS DO NOT EN-
TIRELY ELIMINATE THE PATTERN AS A CUE.
THIS INTERPRETATION IS SUGGESTED BY THE
STUDY OF WAGNER (349), WHO FOUND THAT
WORDS CONSISTING OF AS MANY AS FIFTEEN
CAPITAL LETTERS CAN BE READ CORRECTLY
FROM AN EXPOSURE OF ONLY 100 MS. AN EXPO-
SURE OF THIS DURATION DOES NOT ALLOW
TIME TO PIECE THE WORD TOGETHER FROM
THE LETTERS. SOME USE IS MADE OF THE PAT-
TERN, EVEN WHEN THE WORD IS PRINTED IN
CAPITALS.

In another experiment, Tinker and Paterson (338) showed
that more fixations are needed to read material printed in
𝕺𝖑𝖉 𝕰𝖓𝖌𝖑𝖎𝖘𝖍 than in a modern type face, and Bell (20) dis-
covered that more fixations are made in reading cursive writing
than in reading either typewriting or manuscript. Fixation
frequency is a measure of rate of reading, and in all these com-
parisons the slower rate was associated with the less familiar
pattern. Much handwriting is illegible, but if the reader is

[2] From a silent reading test developed by W. F. Dearborn and C. H.
Westbrook, Cambridge, Mass., 1921. A complete copy of this test is repro-
duced in the Appendix.

familiar with the pattern, he can usually make out fairly well. Horace Greeley's handwriting was a source of distress to most people, but not to his compositor. As one of Greeley's biographers noted: "Mr. Greeley's manuscript, when seen for the first time, resembles an intricate mess of lunatic hieroglyphics or the tracks of a spider suffering from *delirium tremens*. But by those accustomed to his writing, a remarkable exactness is observed" (182, p. 454).

Errors are often overlooked in proofreading because of the influence of the pattern. We have Harry Heilmann, the late Voice of the Detroit Tigers, to thank for the story which credits the Brooklyn Dodgers with once having started a baseball season with the word "Brooklyn" spelled "Brookyln" on their new uniforms. As Mr. Heilmann told the story on the air, six weeks of the campaign rolled by before anyone called attention to the error. While this story may be classed with other baseball fables which the Dodgers have inspired, it still illustrates the proofreader's dilemma.

Two further discoveries should be mentioned before we pronounce the denouement. In a series of reaction-time experiments, Cattell (54) demonstrated that it takes no longer to name a whole word than it does a single letter; and in other tests with a tachistoscope, the same Cattell (55) found that the span for letters combined in meaningful words greatly exceeds the maximum span for letters combined in nonsense arrangements. Zeitler's contention that the ascenders and descenders are seen as actual letters and not merely as projections in the word shape needs to be reexamined in the light of these findings. The results which Cattell obtained definitely prove that a person does not ordinarily stop to ask himself what the letters of the word are before he reads it. The word is perceived as a unit or whole and not by calling the roll of the letters. Consider, for example, the following arrangement of letters: "Albxxy." We have here one capital, which is also the initial letter, two ascenders, and one descender. Being supposedly legible varieties of letters, they might represent the parts of the word which are most clearly seen, and of course the word is "Albany." The same letters quickly lose their cue value when the pattern is

changed: "Axlxby," "Alxxby," "Axxlby." The letters must
form a familiar constellation before a word is suggested. The
influence of the pattern is further manifested in the way in
which it controls the pronunciation of the letters of the word.
The sounds of many letters vary according to the word. The
"c" in "candy" and "celery" provides a simple example, but one
does not need to think twice about which sound to assign the
"c" in each case. The reaction to the pattern solves the problem
for us. The letters do not ordinarily function apart from the
total pattern. Certain letters may stand out more prominently
than others, but this analysis normally occurs within the frame-
work of the larger pattern. In the following passage, Vernon
arrives at a statement which effectively reconciles the facts:

> The conclusion seems to be that some general form or contour is
> perceived, with certain dominating letters or parts arising out of it, as
> the "figure" rises out of the "ground." The ascending letters seem to
> play an important part, and an alternation of vertical and curved letters
> may also help in structuralizing the form. It is improbable that any
> individual letters or parts of words are recognized as such. But they
> are the details, standing out from the rest of the field, which differenti-
> ate its flat clearness, and finally produce perception of the "specific
> object" (346, pp. 118-119).

The fact that the clearly seen letters vary with the word in
question, and that certain combinations of letters are more easily
perceived than others, indicates that it is the pattern which is
apprehended and not the letters as such. Both Messmer (226)
and Korte (198) found, for example, that words which contain

When Mary was a little girl she found a new-born lamb nearly
dead with hunger and cold. She tenderly nursed it back to life and
became devotedly attached to her gentle charge. The lamb was her
constant companion and playmate and was to her what a

When Mary's turn came for her recitations the lamb ran down
the aisle after her to the intense delight of the scholars and the sur-
prise of the teacher. The lamb was put outside, and it waited on
the doorstep for Mary and followed her home.

Fig. 36.—Readability of upper versus lower halves of words. From Huey
(180, p. 99).

a regular exchange of long and short letters are easier to read than words which consist of nothing but short letters. The former have a more distinctive pattern than the latter. There is little to distinguish a collection of nothing but short letters. An associated finding is that ascenders yield better cues than descenders, and that the upper segments of words are easier to read than the lower segments. These facts are illustrated by Figure 36. Which section is easier to read?

Figure 37 shows that the upper half of the word furnishes better cues for word perception when the word appears in small

TO BOLIVIAN DI AN

PARAGUAY OBJECTS

Widens in Eritrea

Italians' Retreat

FIG. 37.—Readability of the upper versus the lower half of the word when printed in capitals and when printed in small letters. From Paterson and Tinker (254, p. 166), by permission of the *Journal of Applied Psychology* and the American Psychological Association.

rather than capital letters. This demonstration may be related to the fact that the cue value of the pattern as a whole is greater in the former than in the latter case.

The Influence of Word Shape in Indirect Vision. All writers agree that the word shape exerts an influence in indirect vision, especially to the right of the fixation point. The letters cannot be clearly seen in the periphery, due to the masking effect which we have previously described, but Dodge (83) noted that the word shape may still be sensed even though the word itself is illegible. The following exercise may be used to test Dodge's observation: Look at the first word of one of the lines of print below. Keep your eyes glued to that spot. Then, without

moving your eyes, read as much of the line as you can. How many words stand out clearly, and what are your impressions of the words farther along to the right? One long word, perhaps three short ones, are about all that you can recognize for sure. Beyond that, the details vanish rapidly until a point is reached at which only the vaguest impression of the word form remains. This experiment is difficult to perform because the eyes have an involuntary tendency to dart to the words which fall outside the area of clear vision. This problem can be avoided by flashing the line of print in a tachistoscope for so short a time that the reader can make no more than one fixation. Hamilton (149) has made a study using this approach. Fixation was controlled at the left and the subjects were instructed to read as far to the right as possible and to guess at the words which they could not see clearly. The words guessed typically bore some resemblance to the words as printed. This finding indicates that the word shadows which appear in the twilight zone to the right have some cue value. Tinker (332) has called these marginal impressions "premonitions" of words, a good characterization. The word materializes in detail when it is fixated in direct vision, but the partial perception which first occurs in indirect vision probably serves a useful purpose in getting the process of complete recognition underway. Tinker (332) cites a case of disturbed vision who was quite unable to read through being deprived of peripheral vision to the right of the point of fixation. The awareness of words in the periphery probably influences the location of fixations along the line, and Meumann (227) has demonstrated the effect of indirect vision on the accuracy of the return sweep.

Small Letter Groups as Cues in Word Perception.—This category includes the prefixes and suffixes, double letters, and other letter complexes or small word parts. These components vary in size between individual letters and the total word structure. Their cue value has been interestingly demonstrated by Wilkins (357). Her test material consisted of a series of mutilated phrases or mixed up syllables. The syllables, if rearranged, formed a perfectly good phrase. The phrases were

printed in double lines and presented to the subjects by means
of a tachistoscope. The exposure time per phrase varied be-
tween 50 and 100 ms. Woodworth (363, p. 744) has arranged
the following exhibit of a few of the responses which Wilkins
obtained:

Words Exposed	Words Read
Washout at Irvington	Washington Irving
Woodson Wilrow	Woodrow Wilson
Psychment Departology	Psychology Department
Renaistecture Archisance	Renaissance Architecture
talder powcum	talcum powder
Shakesbeth Macpeare	Shakespeare Macbeth
Davfield Copperid	David Copperfield

The misreading of words which have not been tampered with
may be similarly enlightening. Almost every long word con-
tains a familiar syllable or two. These may be the parts of the
word which first attract notice, and if the reader does not watch
his step, he may complete the pattern wrongly and confuse the
word with some other word which incorporates the same sylla-
bles. The set of mind occasionally helps to lead the reader
astray. Hildreth (162, p. 147) mentions the case of the
W.C.T.U. worker who misread the title "Pupil Promotion" as
"Pupil Prohibition." We have all had similar experiences. As
Vernon well describes the matter, "many readers, while glancing
through a book or a newspaper, must suddenly have felt as if
springing out at them, giving them a shock of familiarity, a
word very closely connected to some mental preoccupation or
strong interest. On further inspection, they may have found
themselves quite mistaken; the word in question was conjured

up by the thoughts of the moment out of some partial perception of quite a different word" (346, p. 120-21).

Perhaps this is the place to introduce Huey's conclusion (179) that the fore part of the word is more important for word perception than the hind part. Huey reached this conclusion by first demonstrating that it is easier to read material which shows only the first halves of words than it is to read material which presents only the last halves. The four adult subjects who participated in the experiment read at an average rate of 29 words per minute from the first halves and 20 words per minute from the second halves. Samples of Huey's test material are shown on Figure 38. Which passage do you find easier to read?


```
ıy      ures  f    ch ı     eme?   f   is    es   ɔt     eal o
ɔu,   en  ll  ɔu    dly,  om ı     re        tical         point,
ate  he     ıges  ad   ɔrms  st    ıtly     ded?     ır
pose  so      bine  ɔse  ɔws,      tically   ıd      wise,   ıd
o   nd a     ated  py o  ch       ibutor.
      he  ɔms  low     ely    ɡest   ɪing  ics.      ect   ɔse
    ɔu  re   st      ested  n  ıd  ɪd  ay    ers.

aɪ  feat     o  su   ɛ  sch        I  th  do   nɛ  app    t
yɛ  th   wi  yɛ  kin    fr   ɛ  mo  pracɪ    stand
stɛ  tɪ  chaɪ    aɪ  refɛ    mo  greɛ    nee     Oɪ  purɪ
    i  t  com    the   viɛ   statisɪ    aɪ  otheɪ      aɪ
t  se   ɛ  priɪ   co  t  ea   contrɪ
    Tɪ  ite  bel    mer   sugɡ    lead    top    Sel   thɛ
  yɛ  aɪ  mo  inter    i  aɪ  ad  aɪ  oth
```

FIG. 38.—Readability of the first versus the second half of the word. From Huey (179, p. 581), by permission of the *American Journal of Psychology*.

Vernon (346) has expressed a reservation regarding Huey's conclusion. She points out that the part of the word which is most important depends on the word. Many words, especially those of Anglo-Saxon origin, have their root, or main part, in the first syllable. Vernon grants that such words would be hard to read without their first parts, but then she gives a few examples of words of Latin derivation in which the root falls in the middle of the word: "inflammation," "expectation," "subservient." Such words would be hard to read without their middle syllables. The same words without their suffixes find

their root at the end: "inflame," "expect," "subserve." In this instance the word ends would bear the brunt of recognition. Futch (112) found that one of the difficulties in reading Latin proper is that the word endings must be so closely examined.

In any case, the cue is not limited to the first half of the word. The reading rates which Huey obtained for both halves of the word were absurdly slow. The rate of normal reading is likely to be at least ten times as fast. It is a handicap not to be able to see the whole word. We can agree with Woodworth's final conclusion (363, p. 743) that in normal reading the cue consists of "an adequate *simultaneous* view" of the entire word, which is another way of saying that the cue normally consists of the complete pattern.

THE CUE VALUE OF WORD SHAPE AS RELATED TO THE FAMILIARITY OF THE WORD

What we have said regarding the cue value of the pattern is subject to one qualification: the pattern functions as a cue only when the words are familiar. An exception must be made in the case of unfamiliar words. They cannot be perceived except by a process of analysis. These facts may help to explain why authorities have not always seemed to agree on the cues which are most important in word perception. The value which Zeitler and Goldscheider and Müller assigned to individual letters applies mainly to unfamiliar words. These writers conceded that the word shape or structure is often sufficient to touch off the recognition of familiar words. Zeitler, for example, spoke of the "dominating complexes" which come into play when words are familiar. He believed that these complexes could embrace any part of the pattern or even the pattern of the whole word.

The influence of the familiarity of the word on the process of word perception has been demonstrated by Vernon (345), who found that unfamiliar words are misread with far greater frequency in a tachistoscope than familiar words. The pattern fails as a cue when words are unfamiliar, and the time allowed for the exposure does not reveal enough of the detail to permit

the word to be read on that basis. Before the word can be read accurately, it often must be exposed repeatedly, until perhaps all the detail has emerged clearly.

Experiments on the perception of number combinations furnish another demonstration of the effect which the familiarity of the word has on word perception. By and large, numerical arrangements are less familiar than words. More fixations are consequently required to read numbers than words (317). However, *familiar* numbers, like 1776, 3.1416, one's telephone number, or a well-known street address, are often recognized in a single fixation (270). Interesting in this connection are the observations of Luckiesh and Moss (212) that several times as much light is required to read numerals (as in stock market quotations) as to read words of the same length and size of type. The reason why this difference exists is that the mind has learned to perceive words as wholes, whereas numerals are seldom grouped except in familiar combinations, and thus they need to be examined in more detail and hence need more light.

Other studies have shown that fixations pile up on such unfamiliar elements in reading material as mathematical or chemical formulas (271, 330) and foreign words (191). The chemist may read H_2SO_4 in a single glance, but not the uninitiated.

Messmer (226) found that children read less by the pattern itself than by certain details of the pattern which catch the eye. An amusing example along this line concerns Peter, age seven, who misread the road sign "Watch for Pedestrians" as "Watch for Presbyterians." Here we also have evidence of the influence of past experience. Peter had attended Sunday school regularly since the age of four, and his parents were stalwarts in the local Presbyterian church. It is characteristic of children to inject a large personal element into their word recognition. This is another fact that Messmer discovered.

The Influence of the Set of Mind on Word Perception

As mentioned before, another condition which influences the process of word perception is the set of mind or attitude of the

reader. An interesting finding along this line is that the re-
sponse to words exposed in a tachistoscope often reveals the
disposition of mind established by preceding words in the series
(259). This effect can be readily demonstrated by presenting
the names of the following well-known American cities in a
tachistoscope: Detroit, Chicago, New York, Philadelphia, and
Indianpolitics. The last word is nearly always reported as
Indianapolis. The names of the first few cities prepare the
mind for the names of more cities and the false word is read
accordingly. We see what we expect to see. Students in-
variably express surprise when they are shown what the word
really was. Were you fooled by any chance? Probably not.
The experiment works better when the words can be exposed in
a tachistoscope.

A similar effect may be observed in the case of words read
in context. By this we mean the tendency to anticipate words,
once the meaning is grasped. The urge to read ahead is an
important aspect of word recognition. The context often sug-
gests words when other means of recognition fail. Children,
especially, should be encouraged to "read into" material. The
sentence and story methods, which we shall hear more about in
the next chapter, are designed in part to promote this habit.
Teaching words in isolation deprives the child of the influence
of the context.

The set of mind induced by the context tends to swing the
balance in favor of a unitary recognition of words. Experi-
ments on proofreading provide a neat demonstration of this fact.
The reader must not become too absorbed in the meaning if he
is to be a successful proofreader. Crosland (61) found that
even experienced proofreaders miss many errors when they let
the meaning get the better of them. The novice ordinarily has
far greater difficulty resisting the influence of meaning. There
are two typographical errors in this paragrpah. Did you detect
either of them?

True proofreading demands a set or attitude of its own.
The mind must be directed specifically at the discovery of errors.
The expert proofreader does not allow the meaning to take
possession of him. He holds himself in check and reads with

an analytical attitude. Meaning is relegated to the background. It follows that proofreading is a slower process than normal reading. Vernon (347) found, for example, that more fixations and regressions are made in proofreading than in normal reading. This is evidence of the greater attention to detail that proofreading requires. We might note, in passing, that certain methods of teaching reading, like the alphabet and phonetic methods, may actually serve to promote what amounts to a proofreader's attitude. This attitude is all right for proofreading, but it is not well suited to the purposes of normal reading. How the process of word perception is modified by the method of teaching is more fully discussed in the next chapter.

SUMMARY

Studies of misreadings have revealed that three types of visual cues are used in word perception: (1) individual letters, (2) small letter groups, and (3) word shape or structure. Familiar words are perceived primarily in terms of their total structure. The perception of unfamiliar words requires greater attention to the detailed composition of the word. Children who are just beginning to read typically ignore the pattern, principally because all words are *relatively* unfamiliar to the inexperienced reader. The rank beginner is prone to identify words with certain compelling or "dominant" letters. The pattern materializes only through practice. What seems to happen is that, with practice, the response of recognition gradually enlists more and more of the detail until finally the word is organized as a unit and the perception of it is complete. Reading by syllables or "dominating complexes" represents an intermediate or transitional stage in this process. It is possible that the method of teaching complicates this general description of what takes place. This question is discussed as a part of the analysis of the psychology of methods of teaching reading which is made in the next chapter.

Chapter 6

THE PSYCHOLOGY OF METHODS OF TEACHING READING

INTRODUCTION

It is customary to distinguish the following conventional methods of teaching reading: alphabet, phonetic, word, phrase, sentence, and story or paragraph methods. The alphabet and phonetic methods may be described as synthetic methods because they begin with the smallest possible units and build up to the word. The other methods listed may be characterized as analytic methods because they all start with units that can be broken down into smaller parts or elements. Even the word can be reduced to individual letters and sounds, and to that extent it is subject to analysis. This classification applies only to the initial unit of instruction because soon after the start, reading becomes a process both of synthesis and analysis.

This chapter attempts to appraise all these methods from the standpoint of the psychology of learning to read. As stated before, the test of any method is how effectively it sets the conditions for learning to read. We are now prepared to follow through on that principle in the case of the whole gamut of reading methods. In general, that method is best at the start which assures the maximum of meaning for the child. All the methods, however, may have a place somewhere in the reading program, and what we may eventually need to settle for is a combination of methods. But that matter can wait until this review of the individual methods is completed.

We shall review the methods more or less in the order of their historical development. The alphabet and phonetic methods, of course, have the longest history. These are the

methods by which grandmother may have been taught to read. They are also the methods that some old-timers would like to see returned to office. The modern teacher is more inclined to regard the collapse of these methods as good riddance. In this she is plainly supported by the psychology of the matter.

An Appraisal of the Alphabet Method

The use of the alphabet method in this country is roughly identified with the period before 1840. Actually we have not seen the end of it yet. When the alphabet method is used, the child first learns the names of the letters. He is then taught to read by pronouncing the letter names of the word. If the word is "cat," for example, the child says "c-a-t." The process is slow and laborious and it takes the child forever to make any real progress in word recognition. The chief limiting condition of the alphabet method is that the sounds of the letter names alone have no meaning or associative connections. "C-a-t" is not the way that the child has heard cats designated "on the hoof." He has heard them called "cat," and "cat" is what he must hear if he is to know what the word is. If in beckoning a cat, it were our custom to call "Come here, c-a-t," then the alphabet method would be the only method of learning to read the word. Since this is not our custom, the sounds of the letter names alone can have no real meaning for the beginning reader. After all, how is it that parents often communicate in the home when they want to keep information from their young ones? Of course, by spelling out! Far from being a method of letting the child in on the word, the alphabet method at the start is actually a way of keeping words from the child.

There are those who will still insist, however, that they were taught to read by the alphabet method, and they may even add, "That's what's wrong with the schools today; they don't teach children their letters any more." It is claimed that millions were taught to read by Webster's *Spelling Book,* a museum piece nowadays. Such claims are possible only in the light of a further analysis of the alphabet method. The child cannot learn to read merely by pronouncing the letter names of the

word. He must somehow arrive at the pronunciation of the whole word, which is what the alphabet method must come to in the end if the child is ever to learn to read by this method. One thing that may happen is that the youngster will guess the word from the sounds of the letter names. "Oh, that must be 'cat'," he will say, and suddenly he sees the word in a new light. Another solution is that the teacher, noticing the child's bewilderment, may finally step in and supply the word for him. "Johnny, don't you know what word that is," she will ask, "Why, it's 'cat'." "Oh, 'cat'," Johnny responds, and he may have it on the tip of his tongue to add, "Why didn't you tell me in the first place?" Whatever the solution, we no longer have the alphabet but the word method. Why not begin with the word, since that is what it comes to in any case? Spelling out the word is an unnecessary complication. Horace Mann well expressed the matter in the following passage which Fernald has found:

> Let us examine a line with which we are all familiar—the initiatory sentence in Webster's old spelling book:
>
> No man may put off the law of God.
>
> The manner in which we were taught to read this was as follows: "En-o, no, emm-ai-en, man, emm-ai-wy, may, pee-you-tee, put, o-double eff, off, tee-aitch-ee, the, ell-ai-double you, law, o-eff, of, gee-o-dee, God." What can be more absurd than this? Can we wonder that the progress of a child should be slow when we place such unnecessary impediments as these in his way (105, p. 23)?

It has been said of the alphabet method that if it did nothing more, it did teach children how to spell. One questions the value of being able to spell a word, when the child cannot read it. It is entirely possible for children around the age of five or six to be able to say "c-a-t, cat," and even to pick out the letters from the visual pattern, without, however, being able to identify the whole word in print. The child learns to identify the letters, he does not learn to read the word. The whole word is lost to sight in the maze of the individual letters. If later the child learns to identify the word, it may still be by indirection. The first impulse will be to spell it out. The writer is reminded of a

college student who retained that habit. Children taught by the alphabet method are likely to become hyperconscious of the details of the word. They may eventually become accurate word-callers because they have acquired the habit of looking at words carefully, but meaning suffers, rate is retarded, and the fun of reading is spoiled.

These difficulties can be avoided by starting out directly with the whole word. Children can learn to read without being able to identify a single letter by name, just as they can learn to read without being able to write or spell. Learning the letter names serves no useful purpose before the child learns to read. Knowing the letters is mainly important for writing and spelling, and writing and spelling lag behind reading in the language sequence. It is true that some methods like the Calvert Method introduce reading and writing together, but that this is unnecessary is indicated by the common observation that children can normally recognize scores of words from the printed page which they can neither write nor spell. The whole-word approach is neatly adapted to this state of affairs.

The failure of writing and spelling to keep pace with reading can in fact be a source of difficulty in the case of reading exercises which demand writing. The example which comes to mind is the paragraph meaning section of the Stanford Reading Achievement Test (196). This part of the Stanford Test is of the completion type and requires the child to supply from context the words that belong in the blank spaces. The rub is that the children may know the words that fit, but be unable to write or spell them. The writer has observed youngsters who have spent most of the time allowed for the test, puzzling over the spelling of a few words, with the result that they did not get beyond the first item or two before time was called. For such children the test is no longer a reading test at all but one of writing and spelling. The test is difficult for some children just because they are delayed in learning to write and spell. It is a good example of the way in which writing and spelling tend to follow in the wake of reading.

When the child is ready to learn to write and spell, he will need to know his letters and the way they function in our

language. Most children will have learned at least a few of their letters before they learn to read. This is knowledge which they bring to school from the home. The letters, or what remain of them, are readily learned by a process of analyzing whole-word units. This is the most painless way. Worcester expressed essentially this view in his *Primer of the English Language,* published in 1828. To him probably belongs the credit for being the first American ever to advocate the word method. Smith has found the following statement in Worcester's book:

It is not, perhaps, very important that a child know the letters before he begins to read. It may learn first to read words by seeing them, hearing them pronounced, and having their meanings illustrated, and afterwards it may learn to analyze them or name the letters of which they are composed (303, p. 86).

The alphabet method is essentially a technique in word analysis. Virtually all reading experts agree that teaching sight vocabulary should come before teaching word analysis. The place for the alphabet method, therefore, if we can still call it that at this stage, is after the child has made his start and is well on the road to reading. Writing and spelling also enter at this stage and further promote the cause of word analysis.

An Appraisal of the Phonetic Method

The phonetic method succeeded the alphabet method and has had more lives than a cat. As to the difference between the alphabet and phonetic methods, Gideon Thayer wrote in 1857 (as quoted by Smith):

The method of spelling the words should be by the *sounds* of the letters which combine to form them, and not by the *names*. No difficulty will be found in giving the several sounds of the vowels, and after a little practice, those of the consonants will be easily made; and the pupil will be agreeably surprised to discover of what simple elements the consonants are composed (303, pp. 99-100).

Thus when the phonetic method is used in the conventional manner, instead of saying the letter names, the child tackles the

word by giving each letter its phonetic sound. In the case of the word "cat," for example, "c-a-t" becomes "kuh-at." If the pupil pronounces the elements correctly and is able to blend them, the result is that he actually says the word. The youngster may be expected to recognize the sound he so produces, and by way of associating the same response with the sight of the word, learn to recognize it visually as well, but this is the word method all over again. The phonetic method proceeds by the same indirection as the alphabet method. The letter sounds are doubtless more suggestive of the word than are the letter names, but in either case it is the discovery of the pronunciation of the whole word that sets the conditions for learning to read it. Why beat around the bush when we can begin directly with the word? It is as much in order to ask this question of the phonetic method as of the alphabet method.

Learning the sounds of the letters as the first step to reading suffers the same basic limitations as learning the letter names. We have all made the mistake of asking children what such and such a letter says. Isolated letters do not say anything. Just as with the letter names, the sounds of the letters have no meaning in themselves. The unit of recognition is the word. Hence words are best taught as units. The child does not need to know his sounds in order to learn to read. Calling attention to the individual sounds may hinder as much as help. The problem is essentially the same as with the alphabet method. The child can learn to read by the phonetic method. He learns to read by this method by learning to pronounce words. Reading becomes too largely an exercise in mere word pronunciation. We are all familiar with the "word-caller." This habit may result from an overstress on phonetics and word analysis. A superintendent of one of the larger school systems in Michigan once discovered a whole class of "word-callers" in a primary room of one of his buildings. These children had been mainly taught by the phonetic method. On a little test which the superintendent gave the children, he found that the average rate of reading was six words per minute. We can get a notion of what sort of reading that was by reading the following sentence at the rate of one word every ten seconds: "The big bear said

'Someone has been sitting in my chair.' " It can be as bad as that when phonetics and word analysis are pushed to the limit. One wonders what idea the children get of reading, when taught in that manner. They must come to look upon it as pretty grim business.

Aside from all other questions, the phonetic method suffers the limitation that English does not hew to the line phonetically. Take these words, for example, all of which contain essentially the same vowel sound, but in which the sound is represented by different signs : met, sweat, any, said, says, and jeopardy. Or to take the opposite case, here is a list of words in which the sign remains the same but the sounds differ : sour, pour, would, tour, sought, and couple. What is the sound of "ou"? It all depends on the word. Horn (175) has found that the letter "a" carries close to fifty different sounds when used alone or in digraphs. Many of the consonants present the same problem. An example is the initial consonant in "get" and "gem." How is the child to distinguish? Pointing out that one sound is "hard" and the other "soft" will not make sense to the average beginner and will only perplex the child the more. Because of the nonphonetic characteristics of the English language, Bloomfield (28) has suggested that the vocabulary of beginning materials be confined to words in which each letter shows only one phonetic value. If, for example, words like "cat," "can," and "cot" are included, then words like "cent" must not be included. All irregular words are handled separately in Bloomfield's system and are taught at a later time as exceptions. Bloomfield's method is not incompatible with the word method, however, inasmuch as in any case the words are always presented as units. What the method does is to set the conditions for the discovery of the sounds by a process of phonetic analysis.

Of all this, one critic has asked, "if phonics are perplexing to the pupil because of the number of different items he has to remember, what is to be said about learning the approximately 25,000 separate word-whole symbols called for by the whole-word method without the help of either phonics or of spelling?" We can answer one question by asking another : How many people who can remember 25,000 separate word-whole symbols

can remember three phonetic rules? But this is being facetious. We can agree that eventually the child must learn his sounds. Life *is* too short to learn 25,000 different words, each as a literal picture. Children must learn to get words by themselves. One way to get new words is to sound them out. Just as with learning the letter names, however, the most comfortable way to come by the sounds is by a process of analysis again. When the word method is used, the youngsters as a rule begin to pick out their own sounds. The initial consonants are usually the first to emerge. The process is one of observing likenesses and differences among words, and making generalizations regarding the sounds represented by various constellations of letters. Some children acquire all their sounds on that basis and need no special help with phonics. It is erroneous to imply that when the whole-word approach is used, the child is faced with having to learn 25,000 separate words. Words are not all distinct. They can be grouped according to similarities and presented in families, which sets the stage specifically for the observation of likenesses and differences. This is essentially Bloomfield's method. Many others have sponsored the same method, notably Gates (116). It is the so-called *natural* or *intrinsic* method of teaching phonics, as opposed to direct, sounding phonics, which is the traditional phonetic method. In any case it is not a question of whether phonics shall or shall not be taught, but at what stage it should be introduced. Should phonics and word analysis come before a basic sight vocabulary has been acquired? Tate (311) found that children read more fluently and with better comprehension if not taught phonics from the start. Garrison and Heard (114) obtained similar results and also reported that a nonphonetic group lost less during the summer vacation following the first grade than a phonetic group. Mosher and Newhall (236) and Sexton and Herron (298) were unable to demonstrate that including phonetics in the first grade had any advantage. Gates (115) studied the relative merits of a phonetic and nonphonetic method and selected the nonphonetic training as his preference. All these investigators are inclined to agree that the start is best made with the "look-and-say" method. Winch (359), in Eng-

land, demurs, but the bulk of the evidence is against him. Another English authority, Schonell (294), sides with the majority. Research (87) has shown that children are not likely to derive much profit from phonics instruction before they have a mental age of at least seven years. For that reason alone it seems unwise to give more than passing attention to phonics at the start. In the modern school, less emphasis is placed on phonics in the first grade than in grades two and three (41). Sexton and Herron found that phonics instruction begins to show a positive influence on reading achievement for the first time in the second grade.

An Appraisal of the Word Method

This is essentially the "look-and-say" method. The procedure ordinarily involves presenting the child first with a few individual words. The words are so selected that they can readily be arranged into phrases, sentences, and small stories. In the first preprimer of one popular basal reader series, the pupil first learns "Dick," he next learns "look," and then comes "oh." Shortly, we have the combination: "Look, look. Oh, look." The addition of "Jane," "see," and "funny" provides the vocabulary for a number of other expressions which form the dialogue for a simple story. Illustrated by appropriate pictures, the individual words are learned rapidly, as a rule, and the child is able to enjoy the experience of reading simple stories right from the start. The word method is the quickest and most direct way to teach a basic reading vocabulary and to get the process of real reading under way.

Historical Note on the Word Method.—The word method was first suggested by Comenius almost three hundred years ago. In 1657 Comenius wrote in his *Orbis Pictus:* "The very looking upon the picture suggesting the name of the thing will tell the child how the title of the picture is to be read. And thus the whole book being gone over by the bare titles of the pictures, reading cannot but be learned—and indeed, too, without using any ordinary tedious spelling—that most troublesome torture of wits." Jacotot, and Decroly in France, and Worces-

ter and Horace Mann in America, were prominent among those who were to crusade for the method later. According to Smith, the first American reader to be specifically based on the word method was Josiah Bumstead's book entitled *My Little Primer,* which appeared in 1840. It is of interest to note the reasons which Bumstead gave for his departure from what had been the practice at the time. The following passage, as quoted by Smith, is from Bumstead's book:

> In teaching reading, the general practice has been to begin with the alphabet, and drill the child upon the letters, month after month, until he is supposed to have acquired them. This method, so irksome and vexatious to both teacher and scholar, is now giving place to another, which experience has proved to be more philosophical, intelligent, pleasant, and rapid. It is that of beginning with familiar and easy *words,* instead of *letters* (303, p. 87).

The appearance of John Russell Webb's *Normal Readers* in 1855-1856 gave the word method a further impetus in the United States, but it did not really come into its own in America until around 1870, when progressive teachers in many parts of the country began using it. In combination with other methods, it remains fairly universal today. In one way or another, every teacher of reading uses the "look-and-say" method, even if it is only to supply a word which has caused the pupil to hesitate.

Psychological Rationale of the Word Method.—The psychological rationale of the word method has been demonstrated numerous times by laboratory studies of the psychology of reading. Cattell's study (53), reported in 1885, is a landmark. Using the tachistoscopic or short-exposure technique, Cattell found that the average adult reader could, in 10 ms. of exposure time, apprehend equally well three or four unrelated letters, two unrelated words (up to about 12 letters), or a short sentence of four words (or approximately 24 letters if in words). If the limit for unrelated letters was only three or four, the words obviously were not perceived in terms of letters. The experiment definitely proved that we do not ordinarily read by letters but by whole-word units.

Cattell's results were confirmed by Erdmann and Dodge (98) in 1898. These workers found that the span for unrelated letters was only about four or five when a very brief exposure was used. Six or seven letters were often reported correctly when a longer exposure time was used, but that was about the limit for unrelated letters. Whereas familiar words, containing twelve to twenty letters, were easily read during an exposure time of 100 ms.

These findings of Cattell and of Erdmann and Dodge delivered a damaging blow to the alphabet method and gave support to the movement already under way to revolutionize methods of teaching reading. The older notion had been that words are read by compounding the letters. That this is not the case was clearly demonstrated by the finding that words can be read when there was not time to grasp all the letters. Words must, therefore, be perceived in some other way. Cattell believed that the cue for recognition was the "total word picture," while Erdmann and Dodge used the expression "general word shape."

If we do not ordinarily read by spelling out the word or even by sounding it out in detail, little is gained by teaching the child his sounds and letters as a first step to reading. More rapid results are generally obtained by the direct method of simply showing the word to the child and telling him what it is. What makes learning easy by this method is that the sound of the word is already familiar to the child. This is the real justification of the "look-and-say" method. The sounds of the individual letters and of the letter names do not constitute an adequate stimulus in the same sense. Visual symbols acquire an associative force in terms of the response to the sound of the whole word. The applicability of the "look-and-say" method is merely a matter of looking behind this scenery.

The Word Method and Word Perception.—As much as the word method is supported by the psychology of the matter, it is also true that it can create some problems, one of which is that the children may not become as accurate in their word perception as might be desired. With this in mind, some wit has

suggested that the "look-and-say" method might better be called the "look-and-guess" method. We must admit that there is an element of truth in this jibe. Children who have been taught by the whole-word approach are prone to be very uncertain of their words, especially during the early stages of learning to read by this method. There are other problems, but we shall first try to account for the inaccuracy with which children who have been taught by the word method tend to perceive words.

Cues in the Word Perception of Young Children. One hypothesis is that the word method encourages the pupil to depend too largely on the word shape or structure, and that as a result, the child confuses words which are alike in form. Hincks (166), for example, found among her poor readers some who perceived words vaguely and inaccurately as wholes, and she believed that the exclusive use of the word and sentence methods was to blame. A qualifying condition is that young readers do not seem to have much of an eye for the word shape or structure. Word shape has not loomed large as a cue in the literature on the word perception of young children. Sholty (300) uncovered one case of a child who always saw the total word form and never made use of the parts of the word or its letters in its recognition. This child was the best reader of the three who were involved in Sholty's study. Of Dearborn's (73) twenty cases, only six were classified as word-form readers. The basis for so classifying these children were such misreadings of tachistoscopically exposed words as "copy" for "cnpv," "republic" for "rtpbhc," "charter" for "character," "paints" for "parents," "bread" for "heard," "peoples" for "puddles," and "shouted" for "started." And like Sholty, Dearborn found that his word-form readers were the best readers in the whole group.

As we discovered in the last chapter, word-form reading is mainly an adult habit. Among children, only the better readers seem to make much use of the word form, which may not be so damaging to the "look-and-say" method if it is true that this method encourages the reader to depend on the shape of the word.

What children mainly seem to have an eye for is some detail of the word, a single letter or two, which then comes to stand for the whole word; at least, during the early stages of learning to read, youngsters frequently confuse words which have the same letters in them, and the inference is that individual letters continue to play an important part even when the children get the words right. The letters are not recognized as such, but merely as signs representing or distinguishing the word. Thus, Bowden's (37) subjects, beginners all, paid little attention to the total word form or general contour. They read words presented upside down and words in which letters were transposed. Substitutions of letters as "lihac" for "lilac" were immediately detected, however; and other words containing the same letters were confused. Meek (221), citing similar evidence, definitely concluded that for her beginners certain letters or small groups of letters were the chief cues for word recognition. Words which had the last two letters in common were more frequently confused than words in which the first two letters were the same. Rather interestingly, these relations were reversed when only one letter was alike; then the most frequently confused words were those which contained the same first letter. Favorite cues were "i," "g," "o," "k," and "ll." The cue selected varied according to the word. "Doll" and "bill," for example, might be confused, but not "kill" and "ball." An age effect was also observed. An example here was the word "flag." Younger children tended to confuse it with "drag," whereas older subjects tended to confuse it with "fled." Gates and Boeker (128) and Wiley (356) are others who have found that young children recognize words more frequently by letters than by word form. Wiley's results revealed that confusions due to similarity of word beginnings and endings were about equally frequent, while Gates and Boeker found that confusions were particularly likely to occur with words with similar endings. The two studies agreed in finding that confusions of words with similar middles were relatively infrequent. In a study of the discrimination of nonsense letter combinations by first-grade children, a similar preference for the initial and final parts of the word was demonstrated by Hill, who went on to say of her

results that "as compared with the middle, the beginnings and ends of words were most frequently observed and used as cues" (164, p. 496). The first and last letters stand out because they are free on one side from masking by adjacent letters.

The accounts which children themselves give of how they remember words bear out the contention that what they mainly see are the small things. When asked how they remembered the word "monkey," for example, Gates and Boeker's subjects reported variously as follows: one child remembered it by the "two wavy things," presumably the "m" and "n"; another remembered it by the "hole" or "o"; another by the "funny chair" or "k"; another by the "tall middle," or "k" again; and to put an end to this monkey business, there was one child who remembered the word by "the monkey's tail," or "y" at the end. A similar example concerns the case of a child who said that he remembered the word "look" because it had two eyes in it which looked at you.

In the same category of small things are double letters, prefixes and suffixes, and other familiar combinations of letters. These may serve as cues, just as individual letters do. It is what has been described as word-part reading. Word-parts constitute another source of confusion. We may take a few examples from the record of one of Dearborn's cases. The child was a girl of eight who was placed in the third grade. This subject made the following misreadings in the tachistoscope: "high *way*" for "he went *away*," "*extra*" for "*extreme*," "happi*ness*" for "busi*ness*," "ser*ies*" for "colon*ies*," and "sec*tion*" for "associa*tion*." In all but one of these examples, the cue is at the end of the word, which is consistent with Gates and Boeker's finding that the most frequently confused words are those with similar endings. An example from the latter study was the error "horse" for "purse." As previously reported, Meek also found that when the cue involved two letters (rather than one), the most frequently confused words were those which ended alike. Bennett (21), by contrast, found that her subjects were more likely to confuse words with similar beginnings. The fact that Bennett used older subjects than did either Meek or Gates and Boeker may account for the difference

in results. Words are essentially without direction in the case of younger children. One of the things that youngsters eventually learn is the way words go. In how far children notice word beginnings depends on this difference in the stage of learning. Age worked in favor of Bennett's subjects in this connection.

The Selection of Letter Cues as Related to the Word Method. The real point of all these studies, however, is that the results describe what happens during the early stages of learning to read by the whole-word method. This was clearly the method employed to teach the test words in both the experiments of Meek and of Gates and Boeker. In Gates and Boeker's investigation, the subjects first learned the test words through association with pictures. The words were then presented without the pictures. The responses made to these words constituted the basic data of the experiment. In Meek's work the test words were first presented together with the child's response to the actual objects. For each word thus taught, five other words were selected which contained letters in common with it. The confusions which the subjects made between these words and the test word provided the data in her experiment.

Basically, the limitations of the word method stem from the fact that there is no careful analysis of the words. Durrell (92) has described a case which will serve to high-light the problem. The story concerns a child who had learned to read the word "chicken" on a flash card, but who could not later recognize it in a book. When asked how he was able to recognize it on the flash card, the pupil replied, "By the smudge over in the corner." That is what the word method permits. The eyes are left free to rove at random over the word. Whatever feature stands out becomes enlisted as the cue. Usually this is some small detail of the word. Inaccurate word perception is the result.

Inaccurate Perception as a Function of Using Letters as Cues. How recognition by letters results in inaccurate word perception has, of course, already been suggested: it is simply that too many words have letters in common. Consider the words "motley," "money," "many," "market," "marker," and "mankind"—every one of them contains either a "wavy thing

or two," a "hole," a "funny chair," a "tall middle," or a "monkey's tail." Put to the test, a child might confuse any one of these words with "monkey." Words which contain dots over an "i," the "funny cross" of an "x," or which contain some other element in common can be mistaken for each other in the same way. Gates and Boeker's study remains a good source of data here, although Durrell again has offered an example which never fails to put the point across to students. It concerns a first-grade boy who offered to write "Come with me to the tree." He wrote it as "o-w-e-t-h-ee," and then added the comment that " 'O' is a bad one because you never can tell whether it means 'come' or 'go' or 'boys'."

In the conduct of the summer reading clinic at Michigan, it has always been the practice to include an oral reading test among the examinations administered to the children. Errors resulting from confusing words which have letters in common have far outnumbered confusions due to word shape or form. An illustrative record appears below. This record belongs to a boy who was eleven years old and who was placed in the fifth grade at the time his case was studied. The lad had an intelligence quotient of 111 on the Stanford-Binet and a capacity for reading of 5.6 grades, as measured by the Durrell-Sullivan Reading Capacity Test. He had the ability to learn to read, but his actual achievement in reading, as shown by the Durrell-Sullivan Reading Achievement Test, was only 2.2 grades. The record below shows how he read the first two paragraphs of Gray's Oral Reading Test. The text is given in one line and the way in which the child actually read the material is indicated interlinearly in italics. The child had been taught by a method which features the word as a unit or whole, and we have offered this record as an example of the type of problem that sometimes develops when this method is used.

A boy had a dog.
A boy had a dog.

The dog ran into the woods.
The dog ran into the . . . .

The boy ran after the dog.
The boy ran after the dog.

He wanted the dog to go home.
He went the dog to go home.

But the dog would not go home.
But the dog would not go home.

The little boy said,
The little boy-was-said,

"I cannot go home without my dog."
"I come home with my dog."

Then the boy began to cry.
When the boy-went-began to cee.

Once there was a little pig.
Other-other this-other there-with-was a little pig.

He lived with his mother in a pen.
He wanted-he lived with his mother-in a pig-in a pen.

One day he saw his four feet.
One day he went-wi-his food . . . .

"Mother," he said, "what can I do with my feet?"
"Mother-mother," he said, "why can I do what some field?"

His mother said, "You can run with them."
His mother said, "You can run with them."

So the little pig ran round and round the pen.
So-I-so the little pig ran around-around-and around the pen.

The errors which seem particularly to the point were the reading of "come" for "cannot," "when" for "then," "other" for "once," "went" for "saw," "food" for "four," "why" for "what," and "field" for "feet." The reading of "was" for "said," "this" for "there," "with" for "was," and "pig" for "pen" can be included in the same category, even though these errors were subsequently corrected. All are errors which contain, in common with the stimulus words, either individual letters or small groups of letters. It may be inferred that the words were confused with each other on that basis. Thus, "cannot" was mistaken for "come" because of the "c," "once" for

"other" because of the "o," "four" for "food" because of the "f," "there" for "this" because of the "th," and "pen" for "pig" because of the "p," which is only to sample the above errors. Contrary to Gates and Boeker's finding, most of the words this boy confused had first letters in common. An exception was his reading of "when" for "then," where the common cue is at the end. Of course, the cues need not agree as to position at all ("went" for "saw") or even as to direction ("was" for "said"). The reading of "cee" for "cry" was an interesting reaction. What the boy seemed to do in that case was merely to pronounce the name of the first letter of the word.

As indicated by his age and grade placement, this child's reading problem was of long standing, and there was more to it than the method by which he had been taught. The method may have played only a minor part. The child came from a well-managed school, and most of his classmates had learned to read without any difficulty. What the matter boils down to is that some children are going to develop reading problems regardless of the method used. The nature of the problem may vary with the method. The most that we can say of the present case is that the oral reading record is plausible in the light of what we know about the way in which the child was taught to read; that is, the reading habits are those which we might expect would develop under the conditions of the "look-and-say" method, when the method is a factor.

The Word Method and Word Analysis.—In addition to the inaccurate word perception which characterizes the early stages of learning to read by the word method, children who have been taught by this method are likely to be left helpless for a time in the face of new or unfamiliar words. This is the next flaw which people who are critical of the word method invariably find in its armor. We must again confess to some familiarity with the problem which these critics have in mind. An illustrative record from the files of the summer reading clinic at Michigan is presented below. This record is for a boy who was eleven years old and who was placed in the fifth grade at the time that he came to the clinic for help. The child had the ability to learn

to read, as indicated both by the Stanford-Binet and the Durrell-Sullivan Reading Capacity Test, but he could not get beyond the first two paragraphs of Gray's Oral Reading Test. The following record shows how he read these two paragraphs. The record is presented according to the system used in the last case. We need only add that, as in the previous case, this child had also been taught to read by a method which features the word as a unit or whole.

A boy had a dog.
A boy had a dog.

The dog ran into the woods.
The boy ran into the . . . .

The boy ran after the dog.
The boy ran after the dog.

He wanted the dog to go home.
He went the dog to go home.

But the dog would not go home.
But the dog went-did not go home.

The little boy said,
The little boy said,

"I cannot go home without my dog."
"I cannot go home with you dog."

Then the boy began to cry.
When the boy went to the city.

Once there was a little pig.
One day-wa-was a little pig.

He lived with his mother in a pen.
He lived in his mother's in the . . . .

One day he saw his four feet.
One day he was not . . . .

"Mother," he said, "what can I do with my feet?"
"Mother," he said, "where can I do-where you . . . ?"

His mother said, "You can run with them."
His mother said, "The-you are-you can run . . . then."

So the little pig ran round and round the pen.
So the little pig ran around the-around and around the chickens.

This record shows that the child omitted or refused the words "woods," "pen," "four," "feet," and "with." Each of these words was preceded by a long pause, during which the boy seemed to grope for some word that might fit. He could think of nothing appropriate, and so passed on to the next word. It was clear that he was without the means to sound out or analyze the words. His reading was otherwise so inaccurate that he could not even turn to the context for aid. Parts of his reading of the second paragraph verge on a word salad. The record contains many substitutions or confusions of words. These errors are interesting as a further example of the way in which words can be confused because they have some element or feature in common. Apparently, this child confused words in all of the possible ways: his reading of "went" for "wanted" is perhaps best classified as a response to a shape cue; "went" for "would," "you" for "my," and "city" for "cry," as responses to individual letters; and "with" for "without," "when" for "then," "one" for "once," "where" for "what," and "then" for "them," as responses to small groups or combinations of letters. The reading of "chickens" for "pen" is an interesting error. The most likely cue is the "en," which suggests that the child may not have had much of a feeling for the word length. It can also be said of this error that it is broadly tied in with the context. "Chickens" is more than just a word containing "en," in that it is one of the very words that a barnyard might suggest. Bennett (21) estimated that 41 per cent of the errors her subjects made were thus somehow relevant to the thought of the passage. It is an example of the effect of mental set on the perception of words.

Inability to cope with new words, and inaccurate word perception, are related problems. Both constitute a failure in word analysis. The word method remains the culprit. The conditions of this method are such that it may leave some children without a knowledge of the sound elements and of the way in which these elements function in our language. The names of the letters may similarly be left wanting. So it apparently was with Gates and Boeker's subjects. They had been taught by the word method, and it is interesting now to recall how they referred to

their letters: "two wavy things" was made to do duty for "m" and "n," "hole" for "o," "funny chair" for "k," "monkey's tail" for "y," and so forth. Meek's subjects, who had also been taught by the word method, described letters in a similar fashion. Children, of course, do not need to learn their letters before they learn to read. This point is by now ancient history and may be regarded as the reason why it is practical to begin with the whole word. We must no less agree that eventually the child must learn his letters and sounds. The word method may not always deliver on time on this score. We have already spoken of the way in which this method leaves the child free to view the word essentially without direction. Whatever catches the eye determines the direction and character of the eye movements. The cue selected is often some small part of the word, which is what makes learning to read by this method occasionally so inaccurate. The same conditions make it difficult for the child to learn his letters and sounds. What sound is the child to match with the "two wavy things," a "hole," the "funny chair," or the "monkey's tail?" If the attention is caught by the letter at the end of the word, as the "y" in "monkey," the first association will be with the sound of the initial letter. The best that the child can do under these conditions is to match "y" with the "m" sound. Monroe has made a good analysis of this problem in the following passage:

When not reading, a child may perceive correctly the auditory sequence of sounds in the word "cat"; he may articulate the word clearly, and discriminate the sounds precisely. He may however, in correlating the sounds with the printed symbol, "cat," begin from right to left, thinking of the sound of c while looking at the t, thinking of the sound of a while looking at a (correct association), and thinking of the sound of t while progressing on toward the left and looking at c. Thus the child may develop a confusion between the sounds c and t and their appropriate letters, through inaccurate direction of reading (231, p. 98).

Matching letters and sounds correctly requires that the visual and auditory cues agree as to direction. This requirement can be satisfied only if words are consistently viewed from left to right simultaneously as they are pronounced. The word or

"look-and-say" method imposes no control on the direction of viewing the word. The child is just as likely to tackle the word from the wrong end as from the right one. Misreadings such as "went" for "saw," "was" for "said," and "you" for "my" serve to illustrate the basic problem. Confusing "girl" and "dog" is a similar case. Wiley found that this was a fairly common error. In none of these examples does the cue agree either as to position or direction. It is obvious that the children who made these errors had no feeling for the direction of the words. Letters and sounds cannot be correctly matched when that sense of direction is lacking, which means that the sounds are not learned, and a word analysis problem develops, as in the case introduced above. New words in such cases constitute a source of frustration, additions are made to the reading vocabulary slowly if at all, and the child remains an elementary reader. Another approach to the problem which we have here discussed is presented in the next section.

The Development of Left-to-Right Mindedness and the Word Method.[1]—In an experiment conducted by Crosland (62) at the University of Oregon, a series of exposure cards containing nonsense words of four to nine letters each was presented by means of a tachistoscope to a group of 140 college subjects. The subjects were tested individually, an exposure time of 100 ms. per card was used, and the fixation point was controlled at the center of the word. The subjects were instructed to report on record sheets the letters apprehended during each exposure by the positions that the letters occupied in the nonsense word. All letters misplaced in the reports were ignored in the scoring of the records.

For the nine-letter words of the exposure series, Figure 39 shows the group results in terms of the percentage of the total number of letters apprehended which were reported correctly in each letter position from one to nine. The initial letter has the highest recall value. The recall value of the other letters steadily declines until the fifth or middle letter is reached. There is no

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[1] This section is adapted by permission of the publisher from an earlier article by one of the present authors (7).
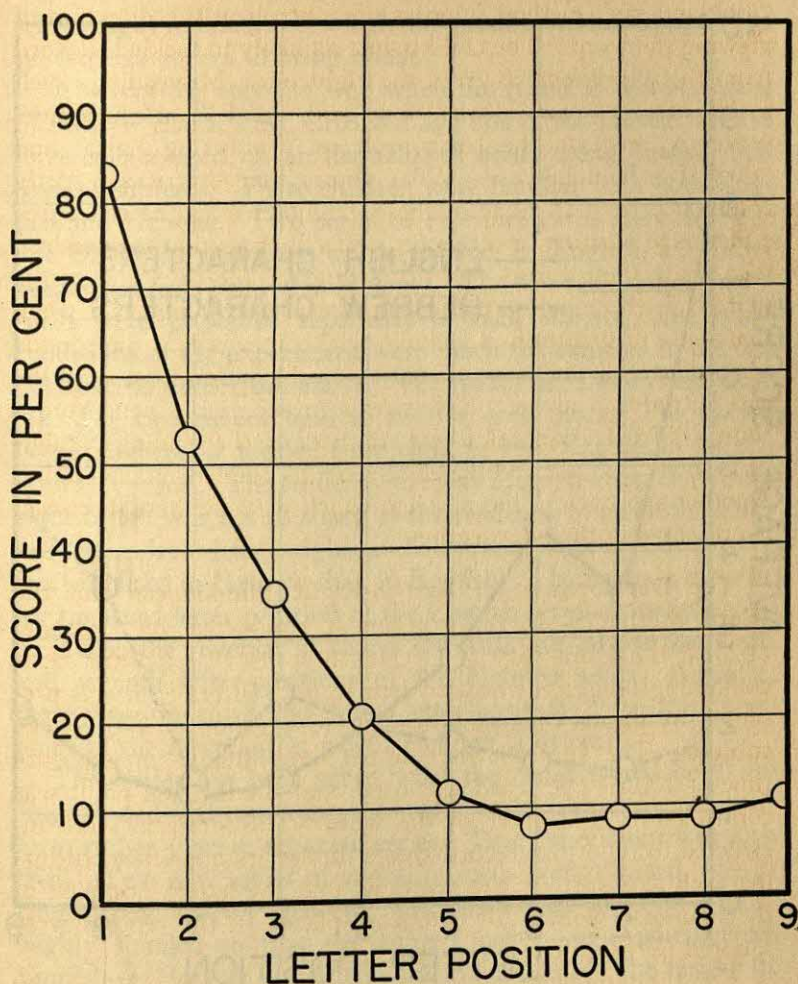
Fig. 39.—Letter-position scores of college students in recall of nonsense arrangements.

significant difference in the recall value of letters five through nine. The mind is attracted by letters at the left, and the recall value of the letters declines from left to right.

Crosland's results may be related to the direction of the English language. Learning to read, write, and spell are all
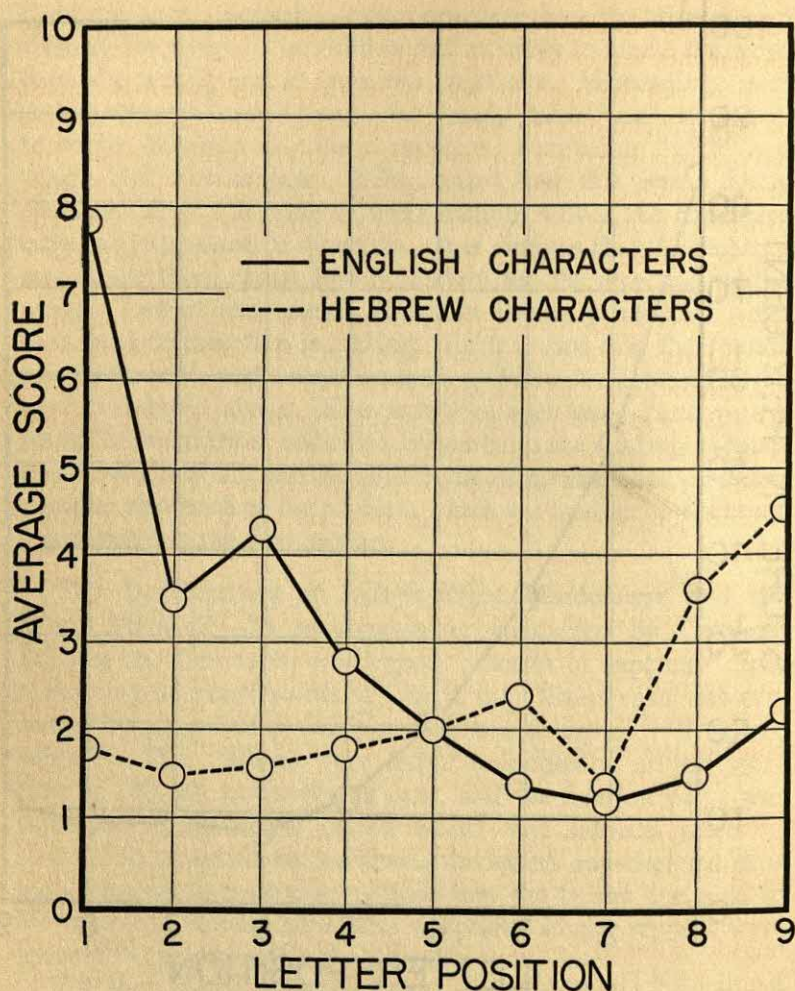
Fig. 40.—Letter-position scores of Jewish children in recall of nonsense arrangements presented in separate series.

accomplished from left to right in English. Left-to-right eye movements were not a factor in Crosland's experiment, inasmuch as the fixation point was controlled at the center of the word, and 100 ms. of exposure time does not permit a change of fixation. Crosland's results may be said rather to express a

left-to-right mindedness, which the practice of left-to-right eye movements serves to bring about.

It works the opposite way when the stimulus words consist of Hebrew characters. Crosland and one of the present writers have collaborated on an unpublished study using Jewish children as subjects. These children were familiar with both English and Hebrew. Two series of exposure cards were devised: one contained nonsense words printed in English, the other nonsense words printed in Hebrew. The two series of exposure cards were presented separately to each subject. The other conditions of the experiment were much the same as in the one of Crosland's described above. The results are shown on Figure 40. The two curves tend to reverse each other. The reason is that Hebrew is tackled from right to left; English in the opposite direction. The tendency to recall Hebrew characters from right to left was not as sharp as the tendency to recall the English letters from left to right, probably because the children were less practiced in Hebrew than in English. The increase in score for the third letter-position of the English series is inexplicable, as is also the reversal in scores for what are labeled the sixth and seventh letter-positions of the Hebrew series. Actually, these were the third and fourth letter-positions from the standpoint of the direction in which Hebrew is oriented.

The writer has been asked what the result would be if the English and Hebrew nonsense words were presented in mixed form rather than in separate series. This experiment was also tried. Two new series of exposure cards were devised, one in English and one in Hebrew. The two series were then thoroughly shuffled so that the subject never knew whether an English or Hebrew word would show up next. The results of this experiment are shown on Figure 41. The two curves again tend to reverse each other, although there is perhaps not quite as much difference in direction as in the case of Figure 40, where the cards were exposed in separate series.

The denouement to all this comes in the results of another experiment conducted by Crosland (63), using a group of good readers and a group of retarded readers as subjects. The children in the two groups were matched with regard to mental
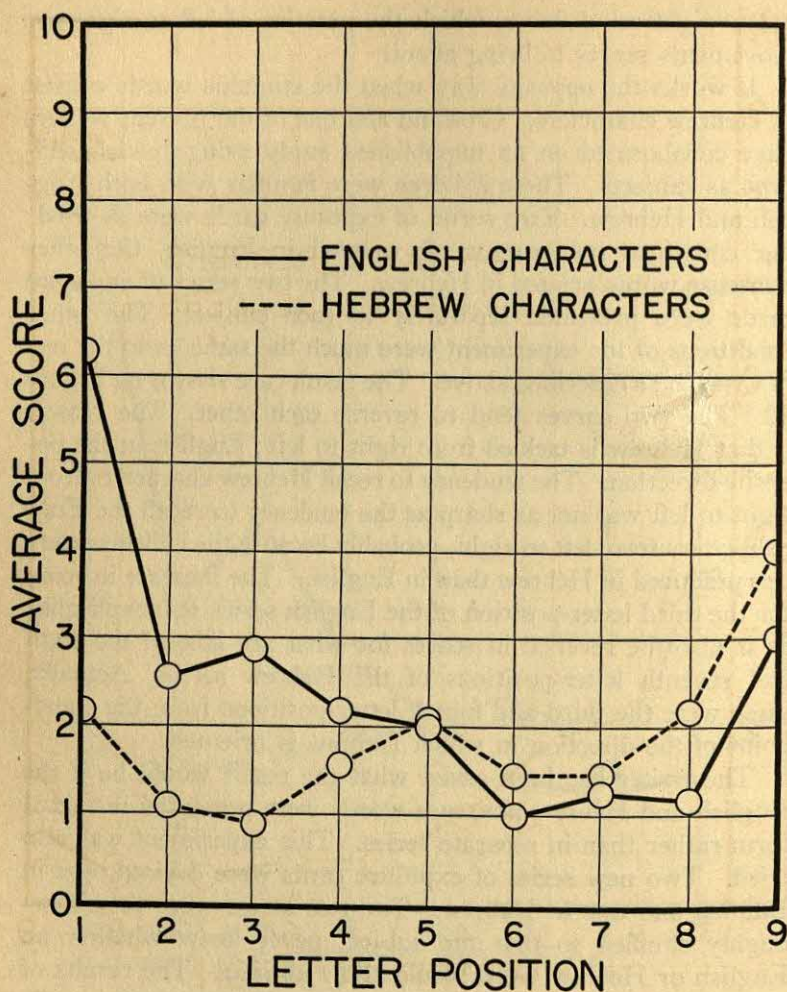
FIG. 41.—Letter-position scores of Jewish children in recall of nonsense arrangements presented in random order.

ability and a number of other variables, including the method by which they had been taught to read. Nonsense words consisting of letters of the English alphabet were again used as stimulus units. The results are shown on Figure 42. As the curves reveal, the good readers caught many more letters in the
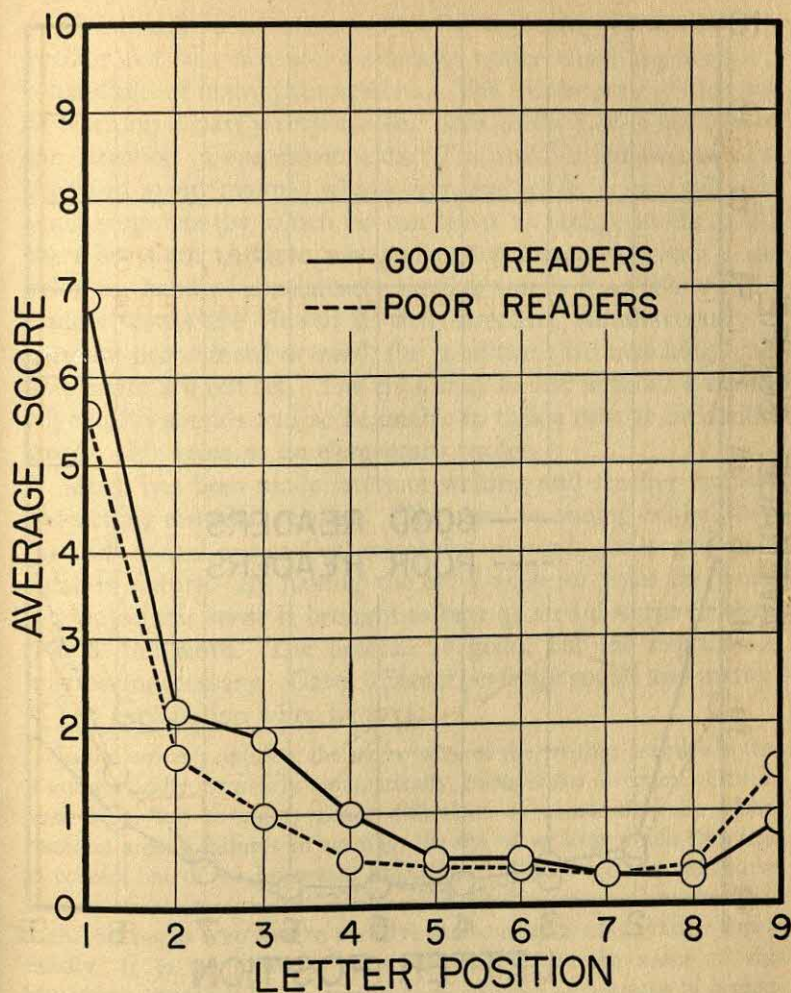
Fig. 42.—Letter-position scores of good and poor readers in recall of non-sense arrangements centered on the fixation point.

leftmost positions of the word than the poor readers. But despite the fact that their total span was more limited, the poor readers excelled the good readers in their recall of the last letter.

In a variation of this experiment, Crosland included among his exposure cards a series of nonsense words, the last letter
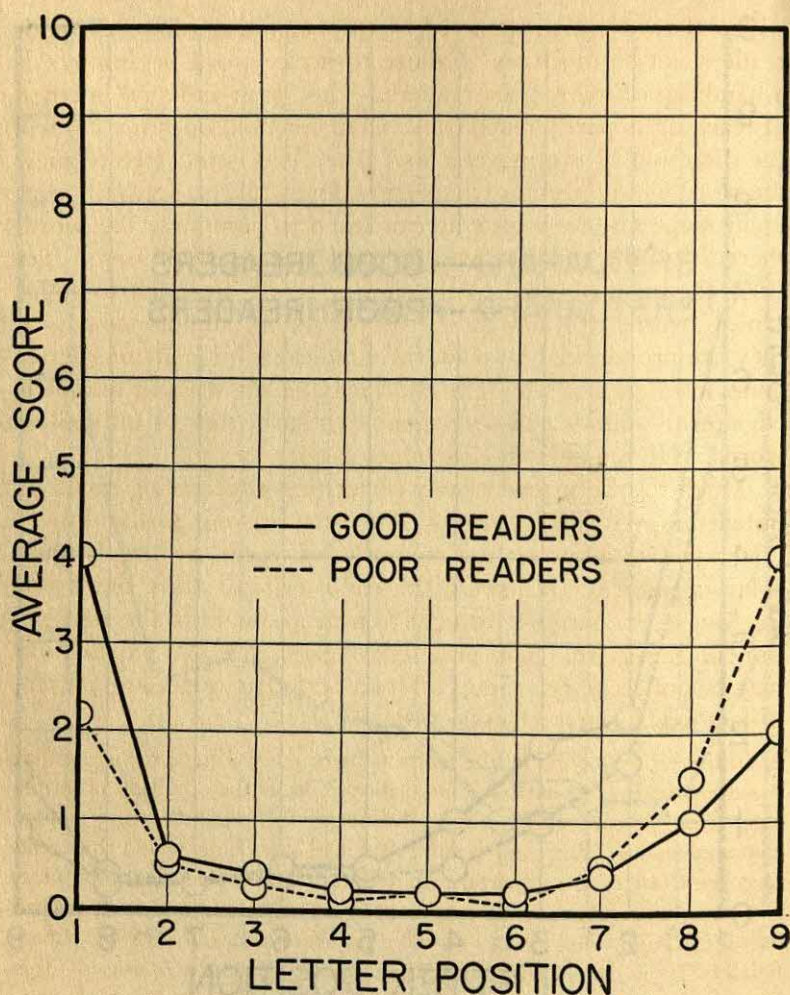
Fig. 43.—Letter-position scores of good and poor readers in recall of non-sense arrangements presented at the left of the fixation point.

of which fell on the fixation point. The results are shown on Figure 43. The poor readers exhibited a clear preference for the end letter. The good readers continued to report the initial letter with greatest frequency. Findings having the same import have been reported by LaGrone (203).

Good readers are attracted by the beginning of words, poor readers not so much so. Failure to notice word beginnings is a handicap of many poor readers. The "look-and-say" method of teaching is partly responsible. This method does not control the direction of eye movements. The child is left free to view the word in any manner whatsoever, and while he may still seize upon some cue by which he can learn to recognize the word, there are some children who fail under these conditions to develop the habit of consistently viewing words from left to right. Unless words are viewed in that direction, simultaneously as they are pronounced or read, the conditions for matching letter and sound are not set. The child may be left without a knowledge of his sounds and so be unable to tackle new or unfamiliar words. He remains an elementary reader.

Much has been made lately of writing and tracing methods of teaching remedial reading. The usual reasoning behind these methods is that our earliest memories of words are largely muscular in nature. By having the child write or trace the word, the kinesthetic sense is brought to bear as an aid to the recognition of the word. The practice is good, but the explanation may be unnecessary. Gates offers a perfectly sound and matter-of-fact explanation when he says:

In the writer's opinion, the main value of the writing practice is that it automatically, or nearly automatically, controls the direction of movement from left to right. Since difficulties in orientation are rather common among failures in reading, the use of writing would thus tend to correct one of the important limitations. The device also, of course, focuses attention upon the details of word structure and is therefore useful for pupils who tend to perceive the word as a whole rather superficially. It is the writer's belief, however, that the value of this kinesthetic approach lies primarily in its function as a means of demonstrating the direction of attack and of calling attention to the details, rather than in any intrinsic or otherwise significant kinesthetic influence (118, p. 366).

In other words, the method is essentially a technique in word analysis. Writing proceeds from left to right, and the eyes watch what the hand does, which means that they also travel from left to right. If the child now thinks the word, or pro-

nounces it, as he writes it, he is in a position in which he can begin matching letter and sound. These are also the conditions under which left-to-right habits of mind can be acquired. Crosland's results can be interpreted to mean that his inferior readers had perhaps not been as consistent in viewing words from left to right as his superior readers. This may be both an explanation of his results and part of the answer to the difficulties which his poor readers were having. Tinker has subscribed to this view in his analysis of the evidence. He makes the point that "in tachistoscopically exposed material, the long-practiced habit of reading material from left to right is dominant. It is logical to infer that such a habit is more effective for good than for poor readers" (336, p. 103).

The Word Method and Learning to Spell.—Spelling records provide some of the best evidence of the shortcomings of the word method in those cases where there is a failure of word analysis. The children are invariably poor spellers for the same reason that they are poor readers; that is, they can no more learn to spell without a knowledge of their letters and sounds than they can become accurate and independent readers. Spelling records throw additional light on this common deficiency, and in that sense are useful in the diagnosis of reading problems. The following record is illustrative.

Words Presented	Words Spelled
do	do
is	is
run	ra
good	gr
my	my
live	lice
late	lat
stone	stor
song	sting
east	est
lady	lat
half	
father	fc
past	pst

build	*pillt*
broke	broke
perfect	*pf*
clerk	*cl*
answer	*soan*
result	*sr*
interest	*int*
opinion	*opn*
business	*b*
whether	*uarr*
imagine	*rb*

This record is for the boy whose reading problem was illustrated by the oral record exhibited on page 221. His spelling errors point to one source of his reading difficulty. A few first letters he had learned to associate correctly with their sounds, but beyond that the record reveals almost no phonetic sense at all. His spelling of "imagine" as "rb" seems utterly inexplicable; "uarr" contains one of the letters of "whether," but is otherwise unintelligible; the letters "sr" occur in "result," but there the sense of direction is lacking; "soan" for "answer" is equally a muddle. It is small wonder that this child had trouble deciphering new or unfamiliar words. His case is an excellent example of the way in which a difficulty in word analysis can cut across both spelling and word recognition.

Spelling at only a slightly less elementary level is illustrated in the record below.

Words Presented	*Words Spelled*
do	do
is	is
run	run
good	good
my	my
live	live
late	*leat*
stone	*ston*
song	*sing*
east	*est*

lady	*lady*
half	*haf*
father	father
past	*pust*
build	*billed*
broke	*brake*
perfect	*parfitd*
clerk	*ckake*
answer	*ansay*
result	*resalt*
interest	*interis*
opinion	*openin*
business	*banass*
whether	*water*
imagine	*immagn*

This record was obtained from a boy who was almost eleven years old at the time of the test. He was placed in the sixth grade and had a Stanford-Binet intelligence quotient of 112. His capacity for reading, as measured by the Durrell-Sullivan Reading Capacity Test, was at the 6.8 grade level, which was more than adequate for his grade placement, but his actual achievement in reading, as measured by the Durrell-Sullivan Reading Achievement Test, was only 3.3 grades. The child was thus reading 3.5 grades below his capacity, as measured by the Durrell-Sullivan Tests. His spelling record plainly reveals that a phonetic inadequacy was a source of some of his difficulty. The record shows, for example, that he was far from sure of his vowel sounds: "song" was spelled as "sing," "past" as "pust," "broke" as "brake," and "result" as "resalt." His spelling of "east" as "est" indicates that he was also uncertain of his vowel combinations. "Parfitd" for "perfect," "ckake" for "clerk," "ansay" for "answer," and "banass" for "business" verge on the bizarre. "Immagn" for "imagine" and "billed" for "build" reveal a better phonetic sense, but the pesky nature of the English language gets the child into trouble there. This is another example of the problem that develops when the method of teaching reading involves little or no phonetic analy-

sis. The school which this child attended definitely favored the word as a unit or whole.

Word Recognition and the Phonetic Method.—By comparison with the word method, the phonetic method promotes accuracy in word perception and independence in word recognition. This fact has been demonstrated by Tate (311), among others. Tate's subjects were two equated groups of IA pupils, numbering 37 and 36 cases each. The experimental group received the regular school instruction in reading, plus fifteen minutes daily of drill and practice in phonics. The control group received only the regular instruction, but with enough time added to equalize the total amount of instruction each group received. The school in which the experiment was conducted had earlier abandoned all formal work in phonics. Care was taken to avoid any incidental teaching of phonics to the control group during the course of the experiment. Every effort was made to confine the regular instruction to a pure "look-and-say" procedure. The experiment ran for two months. The subjects were tested both at the beginning and end of this period by different forms of the Gates Primary Reading Tests. These tests include three parts as follows: Type 1, Word Recognition; Type 2, Sentence Reading; Type 3, Paragraph Reading. The two groups were compared for initial and final performance on all three parts and residual gains were computed. Any difference between the groups on the tests should be a measure of the effect of the instruction in phonics, since it was the only apparent variable. The results showed a median gain in word recognition of 4.6 months in favor of the phonetically-trained group, a median gain in sentence reading of 0.8 months in favor of the nonphonetically trained group, and a median gain in paragraph reading of 1.5 months, also in favor of the control group. The conspicuous finding is the one for word recognition. On this measure the gain for the experimental group was 270 per cent greater than that for the control cases.

A similar study has been made by Agnew (2). In Agnew's experiment, the subjects were two groups of 89 children each.

The groups were matched for intelligence and years spent in school. The subjects of one group were selected from a school system in which any direct teaching of phonics was generally deplored, while the children of the other group came from a school system in which the attitude toward phonics was highly favorable. All the subjects were in the third grade at the time of the experiment. Table X shows how the two groups compared at that time for errors and rate on Sets II and III of the Gray Oral Reading Check Tests. All the differences are sta-

TABLE X

DIFFERENCES BETWEEN PHONICS AND NONPHONICS GROUPS IN RATE AND ACCURACY OF ORAL READING

Test	Average Number of Oral Errors		Average Time in Seconds	
	Phonics Group	Nonphonics Group	Phonics Group	Nonphonics Group
Gray Set II	2.35	8.79	73.04	38.78
Gray Set III	7.05	17.50	77.48	52.87

tistically significant, but of opposite sign for the two scores. The children who had received the phonics were by far the more accurate, but they were also far less fluent than the children of the other group. These findings are strictly in line with expectations. The phonetic method is essentially a letter by letter and sound by sound procedure, and there is less chance that the child will go wrong, but the process is often painfully slow and laborious and rate suffers accordingly. The "look-and-guess" habit associated with the word method is less accurate but considerably more rapid.

The evidence certainly does not justify a return to the tedious phonetic drills of the old school. Such practices have generally come out second best in experiments. In one such experiment, Gates and Russell (129) demonstrated that a method featuring large amounts of conventional phonetic drill was inferior to both a method which included no phonics at all and to a method which incorporated a moderate amount of what was described

as informal, newer type word analysis. The best results of all were obtained for the latter procedure. Tate, Herbert, and Zeman (312) similarly found that formal phonics drill was less valuable than either no phonics or incidental phonics in developing comprehension. The incidental method ranked highest, which is consistent with Gates and Russell's finding for essentially the same method.

There is a place for phonics. It should be subordinated to the main task of reading, which is to get the meaning. In his original study, even Tate found that his nonphonetic group read with better sentence and paragraph comprehension than his phonetic group. That still must be the object at the start. The place for phonics is after a thought-getting attitude has been established. The value of phonics at any time is chiefly in the area of word recognition. We have already spoken of the danger of becoming too conscious of words as such. This is a real danger when phonics receives the main emphasis from the start.

Since meaning is paramount, methods have been developed for introducing children to reading by way of units which are even larger than words. The phrase, sentence, and paragraph or story methods fall into this category. It is time that we proceed to an appraisal of these methods. Meanwhile it is best to suspend judgment on the place of any method. There will be time to settle that problem after we see what the rest of these methods have to offer.

An Appraisal of the Phrase Method

This is really an extension of the word method. It may be termed the "look-and-say-a-phrase" method. The initial unit of instruction is a whole phrase, such as "in the house." The phrase is shown the pupils, the teacher tells them what it is, and they then repeat it after her. These conditions are repeated until the children are able to identify the phrase without help from the teacher. Other phrases are taught in similar fashion. The individual words are expected to emerge by a process of analysis, just as are the letters and sounds when the word method is used.

This analysis follows in part from the discovery of words which different phrases have in common. It is the natural or intrinsic method applied to the analysis of word units from larger wholes.

The phrase method takes its cue from the common notion that good readers are phrase readers. This notion has arisen from studies of the eye movements in reading. These studies have shown that good and poor readers can be differentiated in terms of the number of pauses required to read a line. The better the reader, the fewer the pauses. This finding suggests that the way to improve reading is to cut down on fixation frequency. It is a short next step to the phrase method, the object of which is to encourage children to read by phrases from the start.

Actually, the phrase method betrays the facts. There are even few adults who read entirely by phrases.[2] The late Professor Edward L. Thorndike of Columbia University is a good case in point. Professor Thorndike had the reputation for being among the most omnivorous of readers. He was once credited by the magazine *Time* with having read the *Encyclopedia of the Social Studies* as bedtime reading. But that even Professor Thorndike did not read entirely by phrases is demonstrated by a number of eye-movement records which one of the present writers once had occasion to make of Professor Thorndike's reading (70). One record, for example, revealed that he averaged 7.3 fixations per line, while reading a passage of what must have been for him easy material. It covered some of the policies then in force concerning the promotion of teachers in New York City, clearly educational content. The material itself averaged only 10.9 words per line. That this was not straight phrase reading is a matter of simple arithmetic.

Reading strictly by phrases is the exception rather than the rule, even when the readers are mature. The performance of the typical beginner is characterized by anything but phrase reading. In his study of age changes in measures of the eye movements in reading, Buswell found that his IB subjects made a median number of 16 fixations per line in oral reading and 18.6 per line in silent reading. His IA subjects made fixations

[2] A more extended demonstration of this point was included in Chapter 3.

almost as freely, averaging 15.5 per line in silent reading. Figure 16 is worth reviewing in this connection. It is clear from such records that the beginner is hard put to read even by word units, not to speak of phrases.

As a means of starting out, therefore, the phrase method is impractical. The average beginner is not up to learning to read by phrases. This is not to say that there is no place for phrase work. Following the first grade, fixation frequency reduces rapidly until about the fourth or fifth grade. This was another of Buswell's findings. The place for the phrase method, accordingly, is after the children are well on the road to reading. When so introduced, phrase work promotes fluency and efficient eye movements. The eye-movement records of skillful readers often contain elements of phrase reading. There is a neat example of this in that record of Professor Thorndike's eye movements which was referred to above. As will be recalled, the record contained an average of 7.3 fixations per line on all the lines of the passage. One line, however, was read in only four fixations. The question arises why so few fixations were made on this line, when each of the other lines required almost twice as many fixations. The answer is to be found in the way the line begins. The first five words were "principles and methods of teaching." A person of Professor Thorndike's background would not need to look twice at that expression to get it. Familiar word combinations are often read as units. The object of phrase work is to encourage children to begin recognizing certain familiar word combinations as units. It is one of the marks of the mature reader. Unfortunately, printed matter is not confined to familiar combinations of words. This is the reason why so much of it requires a second look and why fixations mount up. For the young reader, most materials are unfamiliar. The few phrases which it might be practical to teach him to read as units are not likely to be repeated often enough in ordinary text to make much difference one way or the other. He is better off acquiring a basic sight vocabulary and then discovering natural phrase units. The phrase method is not an economical way of teaching a reading vocabulary. Just as the sounds may not be discovered when the word method is used,

the phrase method may involve a failure of analysis covering both the words and the sounds. For example, the child may learn to read the phrase "in the house," but not recognize the word "house" when it appears alone or in a new setting. The individual words tend to be overlooked in favor of some characteristic of the larger pattern. One child, for example, when asked how he was able to remember a certain phrase, replied "Because it is the long one." Perhaps some small detail distinguishes the phrase in the child's mind. In either case, the conditions are not right for learning the words as such. The phrase method goes the way of the word method when it comes to this matter of analysis.

An Appraisal of the Sentence Method

The reader's first impulse here might be that if the child cannot learn to read by phrases, certainly he cannot learn to read by whole sentences. In this case, however, the object is not to present the child with an "eyeful," but with a *thought* unit. According to Smith, George L. Farnham, in 1895, was the first person to sponsor this method in America. Farnham expressed the theory of the method in the following passage which Smith has cited:

The first principle to be observed in teaching reading is that things are recognized by wholes. Language follows this law. Although it is taught by an indirect process, still, in its external characteristics, it follows the law of other objects.

The question arises, "What is a whole? or What is the unit of expression?" It is now quite generally conceded that we have no ideas not logically associated with others. In other words, thoughts, complete in their relations, are the materials in the mind out of which the complex relations are constructed.

It being admitted that the thought is the unit of thinking, it necessarily follows that *the sentence is the unit of expression.* . . .

A second principle is: we acquire a knowledge of the *parts* of an object by first considering it as a whole. . . . Repeated recognitions reveal the characteristics of the whole, so as to separate it from other things. . . . The sentence, if properly taught, will in like manner be

understood as a whole, better than if presented in detail. The order indicated is, first the sentence, then the words, and then the letters. The sentence being first presented as a whole, the words are discovered and after that the letters composing the word (303, p. 140).

The Sentence Method and Gestalt Psychology.—Farnham here speaks like a Gestalt psychologist. The sentence and story methods especially are sometimes described as an application of the *Gestalt* concept that we should begin with a large, meaningful whole and leave the discovery of the individual words to a process of *individuation.* The latter term refers to what we have previously described as a process of analysis. The Gestalt psychologists believe that the natural way to discover parts is by a process of analysis or individuation from a larger whole. They particularly abhor the reverse concept that wholes may be arrived at by a process of synthesis. The alphabet and phonetic methods are thus ruled out at once as being atomistic. On the other hand, the Gestalt psychologists have at times laid claim to the word method. Even the word represents one kind of whole and can be broken down into smaller elements.

The principle of individuation is usually associated with the famous experiments of G. E. Coghill on the tadpole of the salamander. Coghill found that the first movements of this creature involve the organism as a whole. Only gradually do specialized movements of the limbs appear. Infant behavior has been described as following much the same pattern. If one holds a bright object, like a watch, just within reach of an infant three or four months old, it may at first quietly gaze at the watch without moving a muscle for a minute or two, then suddenly begin to lash about with its arms and legs, its whole body wiggling and squirming with animation. If then, by good fortune, an upward thrust of the arm brings the hand into contact with the watch, we may observe, after a number of repetitions of this experience, the child reaching for the watch and grasping it with his hands. The stimulus of the sight of the watch at first produced a diffuse activity of the whole organism, but out of this variety of responses there has developed a very specific

coordination of the eye and hand in reaching. We commonly say that the child has learned how to reach for the watch. To cite another example, when an older child is learning to write, we often observe this same diffuse activity of moving the lips, tongue, even the feet, as well as the hands and fingers, until finally, again out of this general activity, the specific response of tracing or writing a word is isolated or selected. The other movements are gradually dropped, and we say that the child has learned to write.

It is believed by many observers that this *mass activity,* as it may be called, is essential, and that it characterizes the beginning of the learning process. To any new stimulation, according to this view, the infant first reacts as a whole. Learning consists, then, in the refinement of the total pattern of response into a specific response. The sentence method offers an interesting analogy. The sentence, to begin with, constitutes an undifferentiated whole. The discovery of the individual words is in the nature of the differentiation which these notions call for, at least in theory.

Allied with the concept that the natural way to discover parts is from a larger whole is the further Gestalt principle that the whole is greater than the sum of its parts or that the whole contains properties which cannot be found in any of its parts. Thoughts are not conveyed by individual words as such. The meaning of a sentence is a function of the relationship between words. Thus, Hartmann, who writes from the Gestalt viewpoint, believes that the reading of such a sentence as "Fanny has an apple" involves a "certain maturity in the perception of what might be termed 'logical relations'" which thus is "prerequisite to genuine reading" (153, pp. 438-39). In an experiment which he directed, he found that these logical relationships for dealing with verbal materials developed between the ages of five and six, and drew the following conclusion:

Since even the simplest propositional kind of reading makes use of most of these relations, it is small wonder that most researchers find that a child should have a mental age of at least 6 (which a normal child of calendar age 6 would have) before first-grade text material can be profitably undertaken (153, p. 441).

While we may be inclined to reserve judgment as to the finding that this "conceptual maturity" is attained only in such a narrow age range and as to some of the implications of the study, we can quite agree with the following conclusion:

If certain simple relations must be meaningful orally, before ordinary prose can be read in print (because reading is essentially an act of thought), then the best way to create reading readiness is to equip the child with the direct concrete contacts and ideas to which reading as a symbolic performance indirectly refers. When a child's intellectual world has expanded to include the actions, objects, and qualities about which he is going to read, then he is prepared to use these substitute signs for the reality that he knows through other more immediate channels (153, pp. 441-442).

The Sentence Method and Word-by-Word Reading.—The real purpose of the sentence method is to develop a sense for the meaning of a sentence as the first step to reading. From this standpoint, it constitutes an effort to prevent word-by-word reading. This habit, of course, is a familiar one. The word method has often been blamed for it. Some have alleged that starting out with words makes the child word conscious. He gets the idea that learning to read is learning to recognize words. As a consequence, he can't see the forest for the trees. The pupil just bumps along from word to word without any notion of what he is reading. There is no unifying force. The sentence method is offered as an antidote. The initial unit of instruction is a whole sentence. It is a means of bringing to the child's attention the fact that thoughts are expressed in sentences. The words are learned afterward. By this indirect method it is expected that the child will learn to read for what the sentence says.

By way of coming to the rescue of the word method, with reference to this matter of word-by-word reading, Dolch (86) has suggested that the trouble with the older word approach may not have been with the method *per se,* but with the sentences the children were called to read afterward. The passage appearing below illustrates Dolch's point. This passage is from an 1877 edition of *Webb's Word Reader.* John Russell Webb was

among the first to agitate for the word method, and this book is based on that approach and introduces the child to his first lessons in reading:

On a warm pleasant day all
the scholars went with
their teachers out to the woods.

There they saw the large trees,
and the small trees,
and heard the birds sing.

They ran about in the woods
till it was almost night.

That night they slept well,
and the next day
the school was very pleasant.

This material is unduly difficult by today's standards. The sentences are too long, there are too many different words, there is no repetition to speak of, and the content is dull. The stories of many another first reader of that day were equally unsuited to the young learner. The word method came into vogue while such materials were still being used. Any difficulty which the children may have had under these conditions was not entirely the fault of the method. It is easy to confuse issues. The material alone was enough to make word readers of the young scholars. Word reading is always a problem when the material is too difficult. This problem, moreover, is by no means a thing of the past. Word-by-word reading ranks high to the present day among complaints registered by teachers (22). The children included in these complaints have not all been taught by the word method or even by the phonetic method. It is possible that the principal cause of word reading at all times has been the use of too difficult material. This is another lesson that we have learned over the years. Materials have changed as much as have methods. Compare the following passage from a modern first reader with its counterpart of yesteryear:

JACK AND NANCY [3]

Here they come.
Here comes Jack.
Here comes Nancy.

Jack and Nancy live
on a big, big ranch.
They are out for a ride.

Jack and Nancy like to ride
on the big ranch.

Jack rides a cow pony.
Jack rides
a black and white pony.

Nancy rides a cow pony.
Nancy rides a yellow pony.

Most children will much prefer this passage to the previous one. They will also read it more fluently. The one best remedy for word-by-word reading is the use of material which is easy enough for the child and interesting to him. This often means that the material must have a much higher interest level than vocabulary level. Books which are intended for children in the early grades are not likely to appeal to retarded readers in the upper grades. They need books which are simply written, but which retain a relatively mature interest value. Such materials are becoming available in increasing amounts.

None of this implies that we should give up on the sentence method. The idea behind it is a good one. Some children at the age of beginning reading have only the vaguest notions of what a printed sentence is. Starting out with sentences constitutes an object lesson. Not much of a case can be made for teaching words in isolation. Isolated word drill is a quick way to kill interest in a story. It is much better to present the words in context. This assertion seems to have been supported in Cattell's experiment (see page 212), in which the most efficient

[3] From *The Ranch Book*, the primer of the Core-Vocabulary Readers, published by the Macmillan Co., New York, N. Y.

performance was obtained for the short sentences. The exposure time was not long enough to permit the subject to see all the individual words of the sentence clearly. He got the words from context. Context is an important clue to word recognition. Use can be made of this clue by presenting words in context. Sentences represent a stronger associational force than individual words.

The Sentence Method and Word Recognition.—It should mainly be understood that the sentence approach is not a complete method of teaching reading. Sooner or later the child must learn the individual words of the sentences or acquire a basic reading vocabulary. Otherwise he will not be able to recognize the words in new sentences or be able to read unfamiliar material. Here we may run into trouble with the sentence method, just as we did with the phrase method. The child may not notice the individual words of the sentence, but depend on his memory to read it. The first step usually is to memorize the sentence. After it has been committed to memory, the child can repeat it without reference to the words. All that he needs at this stage is some cue to distinguish it from other sentences which he may have similarly memorized. Otherwise he can "read" it with his eyes closed. Obviously the individual words are not going to "individuate" under these conditions. It is the same failure of analysis that we encountered with the phrase method. New sentences naturally pose a problem when the individual words are not learned. The child who read "A boy had a dog" as "I am a little boy" illustrates a typical reaction. Here we have almost a total failure to take in the words of the sentence. The response was touched off by something which was vaguely familiar, apparently the word "boy." What the child said for the sentence makes sense, but this time it does not fit. Part of the trouble is revealed by the position which the probable cue occupied in the two sentences. It seems that the child was confused as to the direction of reading. Learning the words of a sentence and random eye movements do not mix. The "hit and run" attitude is common during the early stages of learning to read by the sentence method, and it must

be accepted as a part of the game, but this child (a boy) was almost eleven years old and placed in the fifth grade. In that case it can be said the sentence method had "gone to seed."

Turning now to another point which Dolch has made in his critique of the sentence method: he explains how it may actually set the conditions for learning the wrong word associations. He uses the following example: The child is shown the sentence "The cat ran away," the teacher reads it for him, he then repeats it after her. But when he says "the" his eyes are on "cat," and when he says "ran" his eyes are on "away." Here the child is in a position to learn to misread these words. Dolch adds the comment that it may be just as bad to form the wrong associations as to form none at all. Actually it may be worse, because then the wrong associations must be undone before the right ones can be formed. The habits first learned remain as inhibiting mistakes.

The basic problem always comes back to this failure to tie down eye movements. All that the teacher may do is to place a line marker beneath the sentence as a means of bringing it to the attention of the pupils. The most that she is likely to do at the start is to *sweep* her pointer from left to right along the sentence as she reads it to the children or as they repeat it after her. The object at this stage is merely to give the pupils the "feel" of moving their eyes from left to right across the line. The teacher is specifically warned not to point out the individual words for fear of encouraging word-by-word reading. The aim of the sentence method is to prevent this habit. However, it is also true that the individual words cannot be learned "on the fly." They can only be learned in direct vision simultaneously as they are spoken, and then only if the right words are singled out. This particular limitation of the sentence method is well illustrated by the experience of a first-grade teacher who had trained her pupils to prepare for their daily rests by writing "This is rest time" on the blackboard. One day, after six or eight weeks of this routine, she wrote only the word "rest." No child knew what it meant. "Rest time" and "this is" could not be read as isolated units either. The whole sentence was needed before the children knew what was coming.

These statements may sound like a damaging bill of particulars, but no such indictment of the sentence method is intended. The problems which we have associated with this method are mainly sins of omission. The sentence approach is readily supplemented by attention to word recognition. The situation with the sentence method is no different than with the other basic methods. Whatever the method, certain problems are going to appear. The nature of the problems vary according to the method. The problems which we have discussed in this section happen to be those which characterize learning to read by the sentence method when sufficient attention is not paid to word recognition. We shall return to the questions which the sentence method has raised after we review the paragraph or story method which suffers many of the same drawbacks. We can then consider the way out of the questions which all the methods have raised.

AN APPRAISAL OF THE STORY METHOD

This is an expansion of the sentence method. The initial unit of instruction is a whole story. The children practice reciting the story until they have it memorized. Assisted by their memory of the story, it is then expected that they will begin tallying the words seen with the words spoken, and so learn the individual words of the piece. As with the sentence method, the purpose of the story method is to develop a thought-getting attitude before all else. The start is therefore made with a unit which lends itself to reading for meaning. The main argument in favor of the use of stories in this connection is that they carry even more meaning than sentences. As a means of applying Gestalt theory, the story method goes the sentence method one better: the sentence becomes an element of analysis when the story method is used. The *Story Hour Readers* of Ida Coe and Alice J. Christie, published by the American Book Company in 1913, were among the early reader series to be based on the story method. The essence of the method is set forth in the following outline which Smith (303, p. 142) has reproduced from the teacher's manual for these books:

METHOD OF TEACHING

   I. Telling the story
  II. Dramatization
 III. Blackboard work
 IV. Analysis
      1. Thought groups
      2. Sentences
      3. Words in groups
      4. Sight words
      5. Phonetics
  V. Reading from the book

The first books to pursue the story method featured nursery rhymes and familiar folk tales. It was believed that the use of such material would develop a taste for good literature. This was the philosophy behind the *Graded Literature Series* of Harry Pratt Judson and Ida C. Bender, the first book of which was published by Maynard, Merrill, and Company in 1899. As Smith has reported, "it was in *Graded Literature* that the Little Red Hen first scratched her name across the pages of readers for beginners" (303, pp. 142, 144). It is interesting that the tale of the Little Red Hen should also have played a central part in one of the few efforts which have been made to evaluate the story method. This is the experiment of Buswell (46) reviewed below.

Memory Reading and the Story Method.—Two groups of children were involved in Buswell's experiment: one consisted of twelve IB and nine IA pupils from the University of Chicago laboratory school, the other of four IB and six IA pupils from a neighboring public school. The laboratory school pupils were taught to read by the story method, the public school group by a combination of the word and phonetic methods. The following version of the story of the Little Red Hen was used as learning material:

        The little red hen found a seed.
        It was a wheat seed.
        The little red hen said,
        "Who will plant the seed?"

The pig said, "Not I."
The dog said, "Not I."
The little red hen said, "I will."

The difference in the method of teaching employed was summarized by Buswell as follows:

The public school emphasized word analysis and recognition above everything else, giving a very large amount of drill in this element. It attempted to stimulate an attitude of interest toward the selection to be read, but not by telling it in the words of the text. The University school placed the chief emphasis upon securing a correct reading attitude by which the child would look for the large meanings in the selection. It did this by letting the child memorize the story before reading it. This was followed by phrase and word drill, but with much less attention to words than in the public school (46, p. 64).

This difference in method had a clear-cut effect on the subsequent performance of the groups. Eye-movement records constituted the chief means of evaluation. We can consider first the effect of the story method. The records for ten IB pupils from the University school who were tested on the above story
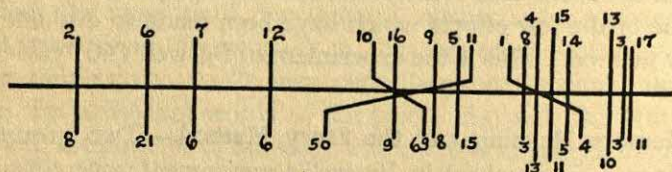
Fig. 44.—Record of the location of the fixations in the oral reading of a IB pupil taught to read the story of the Little Red Hen by the story method. From Buswell (46, p. 67), by permission of the University of Chicago Press.

before the Chicago camera after seven weeks of school showed that only five of the children had learned to follow the lines accurately. The other five pupils identified the story and then merely recited it from memory, letting their eyes rove at random over the page. Figure 44 shows how the fixations of one of these children were distributed. This record is based on oral reading, and only the horizontal location of the fixations is shown. Since the child did not follow the lines accurately, it

was impossible to locate the vertical placement of the fixations. Note where the first fixation falls. It is near the right margin of the page and may be identified by the small serial number which appears at the top of the vertical line. The number at the lower end of the line indicates the time of the fixation in twenty-fifths of a second. The oblique lines indicate head movements, the location of the fixations at those points being somewhere between the ends of the oblique lines. Note next the position of the second fixation. The eyes have now swung way to the left, perhaps to a point where they should have been to start out. On the third fixation, the eyes are again far to the right. One can only guess where the fixations were located vertically. It is clear that this child scanned the page without reference to the words. He "read" the story entirely from memory.

Still later tests were conducted on the same children. On one of these tests Buswell "pulled a fast one" on the pupils. He used not the original version of the story of the Little Red Hen, but a modified edition which read as follows:

> One day a red hen found a little wheat seed. She said to the dog, "Will you plant my wheat seed?" The dog said, "No, I will not plant your little wheat seed." The hen said to the pig, "Will you plant my wheat seed?" The pig said, "Yes, I will plant your seed."

The object in so changing the story was to find out whether the children had actually learned to read, or whether they were still relying on their memory. The latter would be true if the children continued to recite the story in its first form. If, however, they made the changes called for, we would know that they had finally learned to respond to the words. A dictaphone was used to record oral reading. The eye movements were photographed as before. Five of the twelve IB pupils from the University school persisted in reading the story from memory. A good example is a child who was tested for the last time after sixteen weeks of school. This child read the new version of the story as follows:

One day—one day—one day a little red hen found a wheat seed. She said, "Who will plant this wheat seed—said who will plant this wheat seed." "Not I," said the cat. "Not I," said the pig. "Not I," said the dog. "Not I," said—(no)—"Not I," said—"Not I," said the duck. "Not-not I," said the—"Not I," said the goose. "Not I," said the duck. "Then I will," said the little red hen. And she did.

A comparison of this record with the actual text, as noted above, will show how inaccurate this reading was. The child did a fair job on the first line, but the rest of the story is filled in from memory. Buswell's report does not show how the fixations were distributed in this case. As indicated by the child's reading of the first sentence, it appears that he had begun to follow the lines, and that he had finally learned a few of the words, but no sooner had he identified the story than he relapsed into a jumbled recitation of the original or memorized version. A similar example involved a primary-grade youngster who was given the following sentences to read:

This is a cow.
The cow gives milk.
Milk is good for boys and girls.

These sentences were constructed from words which appeared in the basal reader materials used in the school. This, however, is the way in which the child proceeded to read the sentences:

This is the way we wash our clothes,
Wash our clothes,
Wash our clothes.

This child had been taught to read by the story method. The rhyme which he recited was one which he had previously memorized as a part of learning to read by this method. There was something about the test sentences which reminded the child of this rhyme. It seems likely that the cue consisted of the words "This is." Both sets of material start out with these words. The rest was a matter of reciting the rhyme from memory. Most parents have witnessed the same sort of thing at home, before the children are ready for school. It starts by

reading nursery rhymes to the children, perhaps as a part of the ritual of putting the young rascals to bed. Mother Goose is favorite bedtime reading for children, and the youngsters are few who have not been reared on Mother Goose. Repetition does its work here, and before long the children have many of the rhymes committed to memory. They may next be observed going through the motions of reading Mother Goose themselves. They turn the pages with the best of us and recite accurately each rhyme as it appears. Offhand, it looks like the real thing. Only closer observation will reveal that the children are not really reading, but merely memory reading or reciting the rhymes from memory. They could do as well with their eyes closed or with the book turned upside down, once they get a hint of which rhyme to "pull out of the bag." It is enlightening in this connection to watch the eyes of the child as he scans the page. Most of the eye movement will be found to hinge on a search for just such clues. Pictures or illustrations often provide the giveaway. In that case the child will as likely as not recite the rhyme with his eyes glued to the picture, except as he may cast a surreptitious eye at the parents to see how he is doing. There is no need to be disillusioned by any of this. Memory reading is a step before real reading and serves in the nature of reading readiness activity. In reciting stories from memory, the children practice the posture of reading as well as many other functions which have value from the standpoint of preparation for real reading. The unfortunate homes are those in which Mother Goose has not entered, and in which the children have not had the opportunity to hear stories at the hands of their parents.

The Story Method Versus the Word or Phonetic Method.— The IB pupils in Buswell's experiment, who had been taught by a method which emphasized word recognition, followed the lines accurately and read the material as it appeared on the page. They tended to read the material in a mechanical fashion, however, with little show of interest or expression. The IB pupils who had been taught by the story method exhibited quite a different attitude. As inaccurately as they read, they went about

it in an animated manner and seemed to enjoy the content immensely. As Buswell has stated the matter:

All of the pupils from the IB grade of the public school, where the method emphasized word recognition but did not tell the story in the exact words, followed the lines and read the story as it was printed. However, most of them read it in a very mechanical fashion, without giving any evidence from their expression that they appreciated the meaning of the story. The University IB group displayed a lively interest in the content, even though they frequently varied from the printed text (46, p. 72).

Although the IB pupils were the key subjects, it is worth noting that similar differences were found between the IA pupils from the two schools. The latter finding suggests that the effects of method may persist into the future unless countermeasures are taken. As with the sentence method, the basic problem with the story method is that there may be insufficient analysis of the elements of the larger whole. A single word at the beginning of a paragraph may be the sole cue for reading "Once upon a time" for "Once there was a little pig." The process is one of seizing on some element of familiarity and filling in the rest from memory. The wandering eye movements which Buswell observed in some of his cases from the University group may be attributed to efforts to locate such familiar elements. The words are slow to emerge under these conditions, and the child is delayed in acquiring a reading vocabulary. Reading remains inaccurate. On the other hand, children who have been taught by methods which emphasize word recognition and analysis may become too analytical in their reading. The result is that they read accurately but slowly. This is the familiar habit of word-by-word reading, as contrasted with the habit of memory reading and its associated inaccuracy.

It is interesting to view Buswell's results in the light of Messmer's (226) classification of readers into "subjective" and "objective" types. The differences are supposed to be that objective readers have a narrow recognition span, read accurately, and seldom "read into" the material, while subjective readers have a wider sweep of the material, see less detail, bring a large

factor of apperception to bear, and therefore read less accurately. Insofar as method may contribute to this division, it seems that the sentence and story methods would encourage the subjective type of reading, and the word and phonetic methods the objective type.

In conclusion, we should say of the story method as we did of the sentence method, that it is mainly important to remember that it is not a complete method of teaching reading. It is subject to the same sins of omission as the sentence method. According to the theory of both these methods, after the child has learned a number of sentences and stories, he will discover the parts or elements making up the larger whole of his own accord. It is expected that he will first notice small word groups, next the individual words, and finally the letters and sounds of the words. In general, this is exactly what tends to happen. Memory reading may best be regarded as representing merely a stage of learning to read by the sentence and story methods, just as word-by-word reading may represent a stage of learning to read by the word and phonetic methods. A real problem develops only when the children are hung up in these stages. Actually, both types of response have their merits. "Reading into" the material is a desirable trait if enough of the words are recognized to assure accuracy of meaning. As Buswell stated the problem:

Neither method should be judged by the outcomes at the end of the first semester. The purpose of analysis is to indicate that the two methods start out by different routes, one emphasizing words, the other emphasizing content. Ultimately, the pupils must become mature in both. The important fact is that the teacher recognize that the adoption of either method means the carrying over of the undeveloped elements to a higher level in school. The selection of a method resolves itself into a question of which elements shall be developed first, and what shall be the rate of development. Ultimately, all the fundamental elements must be carried to maturity (46, pp. 72-73).

We can agree with Buswell that reading is best taught by a combination of methods. It has become increasingly evident that the teacher cannot adhere strictly to any method without

paying a price. This cost can be avoided by combining the methods. The question which now naturally arises is how the methods can be most advantageously combined. We shall address ourselves to this question in the next chapter. We should first review the present chapter, especially with reference to the conditions which have a bearing on the quest ahead.

SUMMARY

The object of this chapter was to appraise the conventional methods of teaching reading from the standpoint of the psychology of learning to read. Six methods were identified. These were the alphabet, phonetic, word, phrase, sentence, and paragraph or story methods. All these methods mix the bitter with the sweet. The alphabet and phonetic methods are limited first and foremost by the fact that the letter names and sound elements have no real meaning for the child. Learning to read is difficult without meaning, and much of the fun and enjoyment of reading is spoiled as well. Then, too, the alphabet and phonetic methods are mainly oral, which introduces the danger that the child will develop the habit of vocalization and word calling. And last, the piecemeal activity which these methods involve results in an excessive number of eye pauses or fixations, which makes for a gravely retarded rate of reading. The phonetic method is subject to the additional complication that English is not strictly a phonetic language. However, it can be said of both methods that they promote word analysis skill, encourage correct word pronunciation, foster accurate word recognition, stress the left-to-right direction of word attack, and aid the child in spelling. It is too early, therefore, to count these methods as total losses.

The next method which was discussed was the word method. The unit of recognition is the word, and words are more readily grasped by the direct method than by either the alphabet or phonetic methods. Of all methods, therefore, the word method constitutes the quickest way for teaching a basic sight vocabulary and for getting the process of real reading under way. These are decided advantages. However, the word method is also

associated with a number of problems. These include inaccurate word perception, failure in word analysis, limited reading vocabulary, and word-for-word reading. Meaning suffers, and much of the enjoyment of reading is lost by virtue of these problems. The word method clearly needs the support of other methods.

The phrase method was the next to receive a hearing. This method is impractical to begin with; it is asking too much to expect the average beginner to learn to read by phrases. Aside from this difficulty, the phrase method is likely to involve a failure to discover the individual words of the phrase units. When the words are taken out of their original context or presented in different settings, the children are often unable to recognize them. For this reason alone the phrase method could turn out to be a very uneconomical procedure. It is a different matter after the children are well on the road to reading. Phrase work may then do much to promote fluency and efficient eye movements. Along with other methods, the phrase method definitely remains in the running for a place in a complete program of reading instruction.

The sentence and paragraph or story methods were the last on the docket. Both these methods are designed to develop a thought-getting attitude as the first step to reading. This stress on meaning serves to discourage word-for-word reading, to capture the child's interest, and to permit an easy introduction to reading. The miscalculations of these methods include a failure to learn the individual words of the larger units, and the habit of memory reading. These problems can be attributed to a failure to pay sufficient attention to the techniques of word recognition. The sentence and story methods plainly leave room for other methods. The next chapter discusses how all the methods may enter into a balanced program.

Chapter 7 *

TEACHING READING BY A COMBINATION
OF METHODS

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INTRODUCTION

Any effective organization of methods of teaching reading must take into account the order of development of the language-related skills. The language sequence provides a pattern in terms of which the whole language program of the primary grades can be organized. The child learns to apprehend spoken language before he learns to talk, and he learns to talk before he learns to read. Reading grows out of the oral language experience of the child. The choice of the first reading method depends on this relation of oral to written language; that is, preference should be given at the start to that method which makes for the most natural transition from oral to written language. The rest of the methods can then be cast in supporting roles which are consistent with this developmental approach. The remainder of this chapter describes how the various methods shape up when organized according to this plan.

THE INITIAL UNIT OF INSTRUCTION

In a previously cited survey (22), 288 successful teachers of beginning reading were asked to specify the units they used to introduce their pupils to reading. The results, as summarized in Table XI, show that sentences received the nod from well

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TABLE XI

FIRST UNITS OF RECOGNITION USED BY 288 SUCCESSFUL TEACHERS
OF BEGINNING READING

Unit of Recognition	Per Cent of Teachers
Short paragraphs	33.7
Sentences	61.9
Phrases	2.9
Words	1.0
Letters of the aphabet	0.5

over half the teachers in the group. Mr. Farnham would have
been gratified by these findings. As reported earlier, he was
the person who started the sentence method on its way in this
country. Short paragraphs ranked next in popularity. Sen-
tences and short paragraphs accounted for roughly 95 per cent
of the choices. Only a few preferred to begin with phrases, still
fewer with word units. There was one "diehard" in the group
who remained satisfied to cast her lot with the letters of the
alphabet. The sentence method, alone or in combination with
other methods, has found strong backing in other surveys of
expert opinion and practice (287).

THE EXPERIENCE-READING APPROACH

The above results are not surprising. The primary problem
of prereading, as of all later instruction in reading, is that of
meaning—that the child first gets the meaning of, that is, inter-
prets aright, his own experiences—then those given him vicari-
ously by pictures or by word of mouth, and finally by the printed
page. The stress which the sentence and story methods place
on meaning accounts for their appeal. The importance of this
question of meaning leads to one final comment. What the
beginner in reading especially lacks are *context clues* by means
of which he can check the meaning of what he reads. Herein
is found the value of pictures and other means, such as the words
or comments of the teacher or the so-called "experience-reading
charts," by which the child's own "congruous" experiences, that

is, those experiences which "fit," are appropriate or have to do with the matter at hand, may be reinstated or brought to mind to give meaning to the printed words. As Stroud states:

> The young learner often lacks a sufficient fund of experience to enable him to check the meanings he constructs from printed sentences. Moreover, the very simple reading situations with which he is capable of coping are strictly limited as to contextual setting. He lacks the wider purpose and tenor of a paragraph or chapter or book against which to check the meaning constructed by him. By the very circumstance of learning to read, the beginner must start with what is perhaps the most difficult kind of reading, reading isolated sentences. For the foregoing reasons we may see the value of pictures and work-experience charts. They not only suggest words, as a kind of self-prompting, but they also enable the beginner to check the congruency of his construction (308, p. 170).

Meaning is secured when the child has something in his own experience to which he can *refer* or relate the concepts or ideas he gets from reading. If he has no such background of experience, he must, before he can get much if any meaning, secure firsthand experience or, failing that, some vicarious experience with the matter, topic, or subject at hand. To illustrate: Until recently, and perhaps still, a very common unit of work in the first grade was farm life. If, however, to the city child, chickens mean only dead ones hung up by their legs in butcher shops, milk only that which comes in bottles with yellowish stuff on top, and eggs only what is delivered in boxes with neat little compartments, obviously to read about farm life can give little exact meaning without first a trip or two to the farm, motion and still pictures about farm life, and talks by the teachers or by others of the class or at home who have had some firsthand experience with the farm.

The questions arising from this discussion can best be resolved by means of the experience-reading approach. As Smith (303) reports in her excellent treatise on the history of American reading instruction, the experience method came into existence as a part of the activity movement in education. According to Smith's account, experience stories were used to some extent to teach reading in the laboratory school established by John

Dewey at the University of Chicago in 1896, and in the Francis W. Parker School of Chicago, begun by Parker in 1901.

Principles and Methods of Experience Reading.—Experience stories are based on some experience which the children have had in common. The children themselves are encouraged to make up the stories. The teacher serves as secretary for the group, writing down the story as the children dictate it to her. In the modern school, the experience method probably leads all other methods as a means of initiating children into the mysteries of reading. It may be described as a modification of the story method, which at its inception many years ago made use of nursery rhymes and familiar folk tales instead of original stories dictated by the pupils.

Perhaps the most thorough account of the principles and methods of experience reading is that of Lamoreaux and Lee (204). Other sources of valuable information concerning experience reading are the reports of Kallen (192), Hardy (150), Allen (4), and Henigan (157). We are indebted to Miss Charlotte Hardy, first-grade teacher of the University of Michigan Elementary School, for the following statement of the experience method:

The first grade had been invited to the Elliott farm for the day. The children had a wonderful time jumping across a small brook, a brook with a crab in it, so it was most important to get way across so the crab wouldn't get you. There was a lamb that followed where the children led, and the barns with all the animals, and the climb up the very steep ladder to the loft where the grain was stored and where it was all dark and dusty. On the bus coming home, several songs to familiar tunes were started spontaneously:

> I'll go back to the Elliott farm, the Elliott farm,
> the Elliott farm.
> I'll go back to the Elliott farm where the cows and
> pigs are staying.

Then there was one in the Ogden Nash manner:

> Old Mr. Elliott
> Is a very fine felliott.

When the group returned, still fired with enthusiasm, the suggestion of writing down these experiences was made. The teacher said, "What shall we write about first?" One child suggested the brook, so the teacher said, "Let's think of all the things we can about the brook." And this is what the children said:

> There was a crab in the brook.
> Mrs. Loughrin and the bus driver, Mr. Hills, picked up the crab.
> The crab looked like a lobster.
> David tried to hit the crab with a stick.
> The crab was quite colorful.
> He was yellow and green and red.
> The crab was unhappy when Mrs. Loughrin picked him up.
> He tried to pinch her.
> The bus driver put the crab on Leigh's stick.
> He fell off into the water with a plop.
> The crab was quite clumsy.

With the possibilities of the brook exhausted, the children began to tell about the lambs:

> We loved the lambs.
> We liked feeding the lambs.
> The little lamb was very cute when he followed us.
> Really he looked cute all the time.
> It would be hard to tell them from play lambs if they weren't so jumpy.
> Some people use lambs for lawn mowers.
> One little lamb couldn't walk very well.
> He was always baa-ing.

Each sentence was read as soon as it was written, but no attempt was made to help the children read the entire story with its difficult vocabulary and sentence structure. However, the children had the pleasing experience of seeing a story of their very own grow before their eyes. They took pleasure in hearing the teacher read it to them a number of times—chiming in on familiar words and phrases.

On another occasion, a small gray mouse in a jar was a visitor at one of the reading club meetings. After discussing this mouse, one little girl told a true story about a pink mouse that had been at her house one evening. The children enthusiastically suggested writing the story of the pink mouse. This is the tale this group of rather slow growers in reading dictated to the teacher:

Once there was a little gray mouse.
He fell in a pan of pink dye.
He swam and swam.
He was all pink.
Mother saw the mouse.
Mother said, "Oh, you little pink rascal!"

With their keen interest in the story, the young authors easily learned to read it after it had been printed on oak tag with a diagraph pen. So thoroughly did these children enjoy the story that they decided to share it with the rest of the children in the room. The story was so pleasing to the other children that the search for new audiences grew and grew, ending in the office of the Dean of the Education School.

Experience stories may be used in a variety of ways. Many an experience story has served its purpose when it has turned oral expression into written symbols. The children may read each sentence as it is completed. The teacher may read the story as a whole, or she may help the children read the story if it qualifies in simplicity of expression, repetition, and vital interest to warrant the pupils' time and effort. Experience stories should be left in the exact words of the children. The teacher may feel that the phrasing is awkward and attempt to improve it. When shown the teacher's version, the children usually continue to read the story as they originally dictated it. The phrases which come most naturally to the children are those which they themselves employed. These expressions should not be tampered with. Children have their own way of saying things. For example, one child told this story:

My little brother Peter ran away.
My Mom almost called the police.
This is how it happened.
When the mailman left, Peter followed the mailman.
My Mom got on her coat and walked out our walk.
She found him coming back across Berkshire.

After the children have been introduced to their preprimers, the stories they write often fall into the style of preprimer stories, with short sentences, repetition, and easy vocabulary. Such stories make excellent reading material. The following story, dictated by a six-year-old boy after a trip to New York, illustrates this turn of events:

Vovy went to New York.
He saw big buildings.
He saw the Empire State Building.

Vovy saw the Statue of Liberty.
He saw the George Washington Bridge.
He also rode in a subway.
A subway is a train that goes underground.
Vovy went on the subway free.
He went to a movie in the biggest theater in the world.

In addition to the simon-pure experience story that grows out of a meaningful firsthand experience, the teacher may produce tailor-made material based on pupil interests which she has observed. In the beginning stages of learning to read, there is a scarcity of simply written books dealing with a variety of subjects that interest young children.

One first-grade group was interested in the ocean and all its inhabitants. A first grader can see movies about fish and sea animals, he can visit the museum and the fish store, he can look at pictures, but the great wealth of written material about fish is a locked door. The following stories were constructed on large charts for the children:

SALMON

I am a true fish.
I have gills.
I have a backbone.
I have fins. (*Picture*)

STARFISH

I am a starfish. (*Picture*)
I eat oysters. (*Picture*)
Count my feet, 1, 2, 3, 4, 5.
I am not really a fish.

WHALE

I am very big.
I am not a fish.
I am a mammal.
I have lungs like you have.

The vocabulary was kept as simple as possible. New words were replaced by pictures whenever this could be done. The sentences were short. Big pictures at the top of each chart helped stimulate interest and helped in the process of learning to read. Here an opportunity was presented the children not only to "learn to read" but also to "read to learn." In order to make this type of story more filled with suspense

and sense of plot, the teacher may write it for two reading levels—adult and child. The part for the adult reader will serve to carry the story along in an interesting fashion, which is often difficult if not completely impossible when only the controlled vocabulary of the preprimer is used. Great care should be taken that the child's part, even with the simple sentence structure and vocabulary, is an integral part of the story.

The experience story may enrich the child's world of reading or it may be made a boring task that is carried out rain or shine. It should be used as one of many approaches that help the child learn to read. It should always spring from a rich and satisfying experience that the child has had and contribute joy in the reliving of the experience in a vicarious way. It may or may not be suitable for further use in the process of learning to read. Let's remember to use the experience story sparingly enough that it remains a true exercise in the joys of authorship.

The Experience Method and Word Recognition.—It should be understood that experience stories are not designed to replace basal reader materials. Schools which have relied entirely on stories growing out of the activities of children have not produced satisfactory results (126, 207). One source of difficulty is that material dictated by children tends to involve too many different words with insufficient repetition per word (274). The story about the crab, introduced above, offers a good example of this limitation. There are 45 different words in this story in a total of 84 running words. Beginners cannot master words at that clip. By way of comparison, *We Look and See,* the first preprimer of the Curriculum Foundation Series,[1] contains 401 running words but only 17 different words. There are fewer than half as many different words in the whole book than there are in the story about the crab alone. Experience stories obviously cannot match the controlled vocabularies of basal reader materials as a means of teaching word recognition. The experience method, therefore, is not ordinarily used to teach real reading. The purpose is rather to introduce reading as a form of communicating ideas. The discovery by the children of the fact that the sentences which the teacher writes on

[1] Published by Scott, Foresman & Co., Chicago.

the blackboard stand for or mean the same thing as the sentences which they express orally is an important step toward making later reading meaningful. As a means of introducing children to reading, the experience method serves the functions of the story or sentence method. These functions include arousing an interest in reading and developing a thought-getting attitude.

Of course, a certain amount of word recognition occurs even in the case of experience stories. Assisted by their memory of the story, children will sooner or later begin to tally the words seen with the words spoken and so learn to identify individual words. There is no reason to discourage this process. Some children learn to read entirely on that basis, but it is also true that the experience method is not a complete method for most pupils. As a rule, it needs to be supplemented by a good deal of attention to individual words.

The Experience Method and Memory Reading.—Reference in the above paragraph to the memory element associated with experience reading introduces another question which has been a source of debate. Stone (306), among others, objects to the experience method precisely on the ground that it encourages memory reading. This is not necessarily a serious matter. Memory reading is a step before real reading, and where memory reading ends and real reading begins is often uncertain. Even preprimer material is frequently read to the tune of memory. What teacher has not observed children leafing through the pages of a preprimer reciting the story from memory? Having the child plunge directly into his preprimer does not get around memory reading. All children pass through a stage when they rely as much on their memory of the story as on the words on the page. They learn the words partly from their memory of the story. From that standpoint, memory reading is more of an aid than a hindrance. A real problem develops only when the children come to depend entirely on their memory and ignore the words completely. This problem can be counteracted by directing the attention of the pupils specifically to the words.

Other Prereading Activities.—Teachers take advantage of many other opportunities to introduce children to visual symbols and to transmit the idea of reading. For example, children are interested in their names. A child's name is his most personal possession. Just as he enjoys hearing it, so he enjoys seeing it printed in manuscript on the blackboard or on a chart. A picture of each child or a figure representing each child with his name printed beneath makes an excellent beginning bulletin board display. One such display had each figure holding a basket. Each day a child came to school, he indicated his attendance by putting a tiny paper witch or flower or pumpkin in his basket. A newspaper printed on a chart or on the blackboard is an excellent vehicle for putting the children's names in print from the first day of school. For some time many will recognize only their own names. Later names of friends will be recognized. Each morning the children might see:

FIRST-GRADE NEWSPAPER

Today is Monday.
Today is movie day.
Today we will take a walk.
Judy brought something.
Susie brought something.

Through repetition in reading the news, the child learns by the sweep of the teacher's arm that one starts at the top and proceeds from left to right along each line. This session with the newspaper ends with the whole group reading the child's name, and with the child showing a precious possession to the rest of the children.

With the newspaper on the blackboard each morning, and with certain words repeated directly underneath one another, the child may discover that those words look exactly alike. He rushes to the board to share his discovery with the other children. The teacher points out that the words look alike and that they sound alike, and that, whenever one sees that particular combination of letters, it is always the same word. All the children will eventually make the discovery that certain words

look alike, and it is just as important to let John communicate this discovery in March as it was to let Judy announce it on the very first day of school. Some children need a great deal of help to learn that sentences are built from words and that a particular word will say the very same thing each time you meet it, no matter with what other words it is combined.

It is difficult for some six-year-old children to hold a book. Stories written on the blackboard, stories printed on charts, stories thrown on the screen by means of film strips, lantern slides, or an opaque projector focus attention on a central point and help eliminate distractions. There is no book to drop, no page to lose. If a child happens to glance away, all is not lost, for the teacher is keeping track of things and the story may be picked up by watching the sweep of her arm.

Children like to feel that there is a purpose in reading. Here the teacher must exercise her ingenuity to make reading as functional as possible. One device is to print simple directions on the blackboard rather than to tell the children orally:

Wash your hands, please.

Go to the door, please.

Personal letters written by the teacher to individual children, as the need arises, delight the youngsters. Test exercises presented on dittoed sheets lend themselves to this functional approach.

Children associate game situations with a happy kindergarten year. Words, names, and simple directions, written on the floor in chalk, furnish opportunities to run to words which one recognizes. The words should be underlined so the child knows in what direction to face the words. Single letters and numbers may be substituted for words at the various stations.

Activities of the type described here are likely to remain on the program throughout the first year. In the meantime, the children are encouraged to begin reading in their preprimers. The next section describes how the teacher can help the pupils take this step.

INTRODUCING CHILDREN TO BASAL READER MATERIAL

Because first-grade children vary widely in their readiness for reading, the teacher should be prepared for the fact that some of her pupils will want to read from a book on the first day of school. One way to handle this problem is to spread a variety of preprimers on a table for the children to examine. A few will choose one and say, "I want to read this one." Since it is just as important to satisfy the needs of the fast grower as of the slow one, the teacher should try to squeeze in a few minutes each day to read with these children. They often learn to read with a minimum of help. Telling them the names of the words which they do not know is usually all that is necessary. Such children can be expected to read four or five preprimers before some of the others have shown any desire to read a book.

The time will come, however, when a majority of the group will express a desire to read from a real book. A number of companies publish a large chart-type reproduction of the first preprimer. These big books are a useful means of introducing the group to the preprimer of the basal series concerned. Once the child has become familiar with the story in the big book, he is delighted to discover the same story in his own little book. The wise teacher leaves both books within easy reach of the children. On his way to get his rug for rest time, the child may stop at the big book with a friend and read over the story. He may pick up the small book, look at the pictures, and read a page or two before putting it down. He may take it to his rug and read the story softly to himself.

Time used to discuss the characters in the preprimer is time well spent. The story content of the first reading books is chiefly to be found in the pictures. The child should be made aware from the beginning that the words and pictures go together.

Telling the child to look at the picture, or pointing to a specific object in the picture, helps him relate the words to the pictures. Conversation with a great deal of repetition of the names of the boy and girl and the usual cat and dog operates to fix these names in the child's mind. Once the pupil recognizes the characters in the picture and is thoroughly familiar with their names, pointing to the picture of the dog "Tip" or "Perky" will serve to release the recognition of the word. The teacher should encourage the pupil to put himself in the place of the child in the story. For example, she may ask, "What would you say if your dog ran away with your hat?" The youngster may sadly reply, "But I don't have a dog." Then for a moment it may be more important to talk about the child's need for a dog than to pursue the new word on the page. In a short time the teacher may say, "Let's pretend we had a dog that looks like Perky. What would you say to the dog when it ran away with your hat?" The child may, after some discussion, hit on the word "stop," the new word on the page. It will then be fun to find all the words on the page that say "stop." The child may count all the "stop" words. While the child must learn to recognize words as individual units, it is probably better to identify words in context than to drill on a list of words removed from the story and introduced all at once by the teacher. In a survey of the methods recommended in courses of study, teachers' manuals, and books and articles on reading, Myers (238) found that context clues received the most emphasis as a means of developing word recognition in beginning reading. In line with his concept of reading as a process of reasoning, Thorndike (322, 323) strongly recommended teaching word recognition and meaning by way of the context. Hildreth demonstrated the inadequacy of an "artificial serial-order presentation of single words" (161, p. 619). Drill on an isolated list of words is a quick way to kill interest in a story (30).

If for some reason the child is impatient to get on with the story, it is sometimes best simply to tell him the word he does not know. However, after being told what the word is, he should be encouraged to take another look at it before dashing off to the next word. Otherwise he may not remember the word

the next time he meets it. If the word has already appeared in the story, referring back to it often serves to remind the child of it. He may need to reread the entire sentence to pick out the particular word.

Those children who are willing and able to take on a pre-primer the first day of school typically make rapid progress and will be reading by themselves after a month or two. They may still be saying the words aloud but they no longer need the teacher on hand to listen to every word. Encouraging these children to guess unfamiliar words from the context will pro-mote further independence. The teacher can help by such sug-gestions as, "Read the rest of the sentence and see if you can tell what word would be needed to make sense."

A few of the children may still not be ready for the simplest kind of word recognition, but they feel discriminated against because everyone else has a book, while they do not have one yet. These children can make up their own stories about the characters in the preprimer, preferably using the names the book has given the children and animals in the story. The teacher covers the print with a blank piece of paper. She discusses the characters in the story with the children, who then make up their own stories which the teacher writes down for them. Over a period of months, similar stories can be built around the characters of other preprimers. Proceeding in this fashion, the children are often able to read the first stories in several pre-primers before the year is over. As soon as the stories in one preprimer become too difficult, the book is put away with a place marker so that the children can return to it later and resume the stories.

Children who are delayed in starting on their preprimers should be reassured that they will learn to read sooner or later. The teacher should explain to these children that learning to read is a part of growing up. They already know that some of their classmates are taller and heavier than others, and that some have lost their first teeth while others have not. The slow starter should be told that it is the same with reading. Some children read a lot when they are six, others are busy with other parts of growing up and do their reading later.

During the preprimer stage no effort is usually made to teach the child his sounds. Most teachers nowadays believe that the child should first learn to recognize a small number of words by sight before embarking on phonics. In that way he can experience the thrill of real reading almost from the moment he starts in his preprimer. The time will arrive, however, when it does become a distinct advantage to be able to sound out words as a means of recognizing them. An important relationship exists between phonetic ability and reading achievement in the later grades (329) and even at the college level (281). Ability to sound out words is the principal means by which the child gains independence in word recognition and becomes able to make additions to his reading vocabulary on his own. The wise teacher, therefore, will be prepared to help her pupils develop skill in phonics. The next section discusses this aspect of teaching reading, which will leave only the phrase method yet to find a place in the program.

Teaching Phonics and the Techniques of Word Analysis

As explained in Chapter 6, beginning readers are likely to identify words with individual letters. The initial letter is often the cue selected, partly because the pupils have learned from watching the teacher underscore words with her finger or pointer to direct attention to word beginnings. As a rule, the words of the first preprimer begin with different letters so that at this stage the first letter is a sufficient identifying cue. With more advanced material involving a wider variety of words, the initial letter will no longer serve as a sufficient cue because now many different words will start with the same first letter. The child will confuse these words if he continues to depend on the first letter alone or relies solely on some other letter which the words have in common. In order accurately to read words having the same first letter, the child must look at the end of the word as well as at the beginning. The teacher should point out this fact. She may print two words which are confusing because they have similar beginnings, and so help the children discover where the identifying differences lie. If the pupil is ready for this new

step, he will respond eagerly to the teacher's guidance. If he is not ready for it, the teacher's explanation will mean nothing to him and he can remain happily with an easier book.

Most children discover differences between words on their own. Aside from the factor of maturity, the principal requirement is practice. As explained in an earlier chapter, through practice or repetition the response of recognition gradually enlists more and more of the word detail until the word is eventually organized as a unit and its perception is complete. Differences as well as similarities between words are discovered through this process. The observation of these likenesses and differences ultimately leads to the discovery of phonetic elements in words. These discoveries are made by forming generalizations regarding the sounds of the elements or components which words have in common. Once these generalizations are made, the individual sounds are isolated by a process of abstraction. The initial consonants and consonant blends are among the first sounds to emerge. As indicated in Chapter 6, learning the sounds on this basis has been described as *natural* or *intrinsic* phonics. It was also pointed out in the last chapter that bright children can often be left to acquire all their sounds by this method. In the case of those who are slower to catch on, exercises of the following type, utilizing words from the stories read in class, may help the youngsters to identify phonetic similarities in word beginnings.

GROUPING BY INITIAL SOUND

Directions: Look at all the words carefully. Put the words that begin with the same sound in the same column in your notebook.

him	hate	race	still	snow
have	horse	run	some	hurt
was	won't	her	happy	radio
same	sing	sand	haven't	rainy

GROUPING BY INITIAL BLEND

Directions: Look at all the words carefully. Put the words that begin with the same sound in the same column in your notebook.

steel	wheel	brake	bring	child
brought	brain	brown	chum	trace
trick	train	stay	chicken	star
chain	chase	chair	what	why
when	children	sting	track	where

The similarity may involve word endings. Here the presentation of words in families may assist the child to generalize the sound of the common ending. The following words illustrate what is meant by one of these word families: cap, lap, map, nap, rap, sap, tap, trap, scrap, flap, slap, clap. Similar families can be derived from numerous other endings. Series of words based on such endings can be used to construct games, word wheels, as well as test exercises like the following:

LEARNING TO OBSERVE WORDS CAREFULLY

Directions: Find one word in each row that does not belong there.

1. thing	sing	song	bring	wing
2. school	fool	pool	stool	show
3. track	face	space	race	grace
4. rain	back	train	sprain	main
5. back	shack	black	race	tack
6. show	blow	pool	row	arrow
7. shake	shave	stake	make	brake
8. day	stay	space	gray	delay
9. boy	day	toy	destroy	enjoy
10. name	blame	train	same	game

Rhymes are a source of satisfaction to children. They enjoy making up rhymes and chants. The children quickly discover that rhyming words have endings which sound alike. Writing the words on the blackboard helps the youngsters discover that rhyming words have endings which also look alike. The sound of the rhyming element is learned by matching the visual likeness with the auditory likeness.

Once the child has become familiar with various word beginnings and endings, he is ready to perform exercises like this:

LEARNING TO BUILD WORDS

Directions: In Column A you will find some word beginnings. In Column B you will find some word endings. Can you draw a line from A to B making some real words which will fit into the sentences below?

A	B
br	ing
fr	ool
th	ake
spr	ank
fl	ame
st	ain
sch	eeze

1. Here comes a car! Put on your _____ and stop quickly!
2. That fire makes a lovely red _____ .
3. Run! That bee is after me! I think he's going to _____ me!
4. I must _____ him for giving me this nice birthday gift.
5. It was so cold last night that I thought I would _____ .
6. Don't lift that heavy box! You might _____ your back!
7. See all the children carrying their books to _____ .

Whenever possible, new words should be presented in the light of words with which the child is already familiar. This practice will call attention to similarities between words and enable the child to recognize new words from certain familiar parts which they have in common with old words. In like manner, many large words are compounded from, or have imbedded in them, small words which the child already knows. Spotting these old friends often gives the large word away. It is possible to alert children to these familiar components by means of various test devices. Here is an example:

FINDING SMALL WORDS IN LARGE WORDS

Directions: Draw a circle around all the little words that you can find in these larger words.

grandfather	against	dropped
branches	listening	falling
frightened	remembered	whispered

case of children who are already too meticulous in their examination of words.

A few children persist in confusing words on the basis of partial perceptions long after the rest have passed through this stage. These pupils often reach the fourth or fifth grades in school without having learned to make an adequate distinction between words. Teachers should continue to encourage these children to examine words in greater detail. The end of the word is usually the part that is overlooked. Remedial exercises of the following type are designed to combat this problem:

NOTICING DIFFERENCES BETWEEN WORDS

Directions: Read the short paragraphs below and draw a line under the right word for each one.

1. Sometimes when I am sick the doctor gives me—magic—medicine—mediate.
2. The fireman dashed into the burning building to save a little girl. In a few minutes he ran out, carrying the frightened child. Everybody said that the fireman had been brave, for the little girl had been—retired—rescued—reviewed.
3. The great Zeppelin was—delighted—delayed—delicate—in its take-off, for an important passenger had not yet arrived.
4. "Thank you for helping me, boys," said the old lady. "I—apply—appear—amplify—appreciate—your work."
5. It was Christmas Eve. The whole family was busy—decorate—decorates—decorated—decoration—decorating—the Christmas tree.

As the last item in this test illustrates, one and the same word may have different endings, depending on the context. This condition is another source of confusion to children who have not learned to observe words with sufficient care. Another type of exercise which can be directed specifically at this problem is shown below:

NOTICING ENDINGS

Directions: Put the right ending on each of the underlined words so that the story will make sense.

Helen and Mary went walk_____ . They walk_____ as far as the old schoolhouse. They play_____ on the swings there for a while.

At last they saw Tom com_____ across the field. He was carry_____ a tiny brown puppy. Helen and Mary jump_____ off the swings and went run_____ over to see Tom's pup. But before they could pat him, the pup jump_____ out of Tom's arms and went scurry_____ across the field. The three children start_____ after him as fast as they could go.

It is not within the scope of this book to offer a complete blueprint of methods of teaching phonics and word analysis. An attempt has been made in the present discussion merely to plot a general course, with only the major landmarks indicated. Those who desire more detailed guidance will find it in such books as those of Gray (143) and Durrell (94). In this connection, however, it is important that the teacher do not lose her perspective. The main emphasis should continue to be given to content which is vital to the child. The best methods of teaching phonics remain those which involve meaningful content and which lead to the discovery of the sounds from whole-word units (81, 129).

PROMOTING FLUENCY IN READING

Mastering the word recognition and analysis skills called for by beginning reading materials puts a brake on the earlier habit of memory reading. The result is that many of the children will now be reading word for word. The going is slow and laborious and not nearly so interesting and fluent as the earlier memory reading had been. It is at this stage that the phrase method comes into its own. The teacher can take the meaningless jumble of words the child has just read and express them as a well-phrased sentence. The child can then repeat the sentence, using the same natural expression. After figuring out the individual words of a sentence, children often reread it themselves as a well-phrased unit in order to get the full impact of the meaning. The teacher can also point out that certain words just naturally go together: *Susie wants to go into the house.* It is profitable to stop occasionally in a story to figure out what

words go together and to make the reading of that sentence sound just right. Some children will enjoy games with phrase cards. Such cards are obtainable commercially, or they can be constructed by the teacher. Vocabulary difficulties should continue to receive attention. Records should be kept of words that are repeatedly missed or that cause the child to hesitate. Games based on such words are helpful.

The first books in our time specifically to give attention to phrasing were Ernest and Bertha Cobb's *Arlo Readers*.[3] Every consideration was taken into account in printing these books to encourage the young reader to read in natural phrase units. There were three units in each complete line of print. There were no hyphens in the books, and if the lines could not be set up in type according to this rule of three, the material was rewritten so that the reader could always count on finding just three phrase units in each full line.

Failure to grasp the thought of a passage is the principal cause of word-for-word reading. The teacher should, therefore, make every effort to help the child learn to read for meaning. When the child understands what is happening in a story, he naturally reads in thought units. Talking over a story with the child before he reads it will help him follow the sequence of events. Reading with a definite purpose in mind focuses attention on the meaning. The teacher can help here by making suggestions like these: "Read this page and then tell me what John said when Daddy gave him the surprise." "Would you like to tell your story to Jimmy, since he is reading a different book?" Test exercises of various types promote growth in comprehension. Here is an example of an exercise of the completion type:

Pete, the Penguin, was always very anxious to fly. Penguins are eager to fly because their wings are so small that they are unable to fly. But Pete's idea was not to fly himself, but to _____ in an airplane.

Paragraphs in each of which one word or phrase does not harmonize with the thought of the whole are amusing and alert

[3] Published under various titles by the Arlo Publishing Co., Newton Upper Falls, Mass.

the child to the meaning. The child crosses out the incongruous word or phrase. The following paragraph illustrates this test device:

In winter we enjoy winter sports very much. It's great fun to go skiing down a smooth hillside and slide right into a patch of violets.

Multiple-choice and true-false questions about the material read are an effective means of directing attention to the meaning. Sometimes the pupils might be allowed to read the questions first and then to read with the purpose of answering the questions correctly. As the children gain in experience and skill, the teacher will resort more and more to such devices as a means of pointing their silent reading toward meaning and understanding. No serious problem of word-for-word reading remains after the children have learned to read for meaning.

Adjusting Instruction to the Individual

In the foregoing discussion, no effort was made to specify the exact time at which the various skills involved in learning to read should be taught. Teachers are interested in this question, but it is not possible to propose a uniform schedule. Learning to read is an individual matter. Children differ widely in their rate of progress, even under the most favorable conditions. Thus after learning as much as she can about methods of teaching reading, the teacher should realize that the battle is only half won. The problem of adjusting these methods to the individual remains. As a means of showing how this particular problem can be met, we will now trace the progress of three children who entered the first grade with vastly different capacities, backgrounds, interests, experiences, and patterns of growth. It is hoped that this account will illustrate how the teacher can help each child in her charge to learn to read as much as he is capable of achieving comfortably at a particular time.

Characteristics of the Individual Children.—*Claire* was a small child physically. She was prone to suck her thumb when not otherwise busily occupied. When Claire entered the first

grade, she had a good-sized sight vocabulary. She enjoyed books and did much incidental reading of any material that appeared about the first-grade room or on signs and posters during the course of group walks. Claire was above average in intelligence. She was a healthy child who missed only one day of school during the entire year. Socially, she was a star in the group, a child whose opinion was respected and deferred to. She made no use of her position in controlling the children, but remained kindly and warmhearted in her relationships. She had one sibling, a sister, who was a year younger.

Judith was one of the older children in the group. She had her seventh birthday during the spring of the first-grade year. Judith was a fairly large child who was always attractively dressed. Socially, she felt rather insecure at the start of the year, but by the beginning of the second semester she had made many new friends. Her mother reported that Judith had had a most unhappy first year in nursery school, and she felt that this unfortunate experience had influenced her later adjustment in school. Judith was the oldest of a family of three children.

Roger was a boisterous child who was chiefly interested in blocks, toy cars, performing at the workbench with hammer and saw, and hard outdoor play as a member of a boys' gang. Roger was one of the most immature members of the group. He was well liked by both boys and girls, and he held a secure social position which he furthered by bringing many fascinating toys from home and sharing them happily with the other children. Roger was an only child. It may have been for that reason that he was more interested in making warm, personal contacts with the other children than in such solitary pursuits as reading, painting, and drawing.

Month by Month Progress of the Children.—*September:* Claire showed some interest in the display of preprimers which Miss T had placed invitingly on a central table. Judith's interest in the preprimers was keen and immediate. She asked if she could "read one today." Miss T suggested that she pick one out and put a card with her name on it in the book-pocket at the back. Judith said she would because she could write her

name. Somehow, with the many group activities on the first day, Judith did not have a chance to read with Miss T. She mentioned in a disappointed tone that she had not learned to read at the end of the day. This omission was remedied on the following day when Miss T found time to give her help with the book, *Tip*.

Roger came in and immediately announced in a loud voice to Miss T and the children, "Now I'm not going to learn to read." Several times during the first two weeks he came up to Miss T and said belligerently, "Now, remember, I'm not going to learn to read." Miss T assured him that it was perfectly all right not to read. There were many other things he could do.

On the first day the teacher put on the blackboard:

FIRST-GRADE NEWSPAPER

Today is Monday.
Today is the first day of school.
There are 26 children in the first grade.
Roger brought something.
Jimmy brought something.

Claire could read the newspaper, with help on some of the words. Roger did not recognize his name in the paper, as Jimmy did, but he was most pleased to hear his name read and to have it pointed out. Miss T asked if he would like to draw a line under his name. Roger was pleased to perform this act. He also hauled out a road-grader toy which he had brought to school to show the children.

Miss T phoned Roger's mother in the evening and asked if she knew of any reason for Roger's antagonism toward reading. Mrs. M reported that Roger had played all summer with an older child, Butch, whom he admired and looked up to. This child had completed the first grade in another school and had acquired a thorough dislike for reading, after having encountered nothing but failure in the subject. He had repeatedly warned Roger not to have anything to do with reading. Mrs. M agreed with Miss T that it was wisest to let Roger take his

own time to overcome his fear of reading and to develop in maturity.

During the second week the teacher printed in manuscript on the blackboard:

Come to lunch.
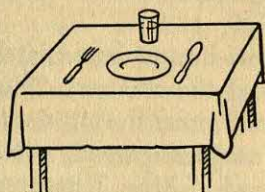
Claire read this sentence aloud, and promptly carried out the direction. Judith commented on the picture, and with several of the other children followed Claire to the table. Roger went along but showed no interest in the picture or symbols. Miss T tried through such simple directions, use of childrens' names in the newspaper, and news of events in the first grade to make reading as functional as possible.

Roger enjoyed activity, so a game was devised with simple words, childrens' names, single letters and numbers printed on the floor in chalk. The teacher would say, "Will the number 2 see if he can run over to 4?" Roger, with a number of the other children, asked for this game on several later occasions. Roger also showed facility in the dictation of stories which Miss T wrote down as he told them.

Judith almost finished her preprimer, reading nearly every day with the teacher. Claire chose a preprimer, but showed no enthusiasm in reading it. One day Miss T brought out two preprimers and asked Claire if she would like to choose one of them to read. Claire looked pleased and said shyly that she had already finished those easier books. Miss T was reminded again by this incident that it is as important to adjust the reading program to the rapid as to the slow learners.

October: The atmosphere was charged with witches, black cats, broomsticks, and pumpkins. Roger brought a pumpkin to school. He wanted the children to help him make a jack-o'-

lantern. After discussing the best way to make a jack-o'-lantern, a chart was made which said:
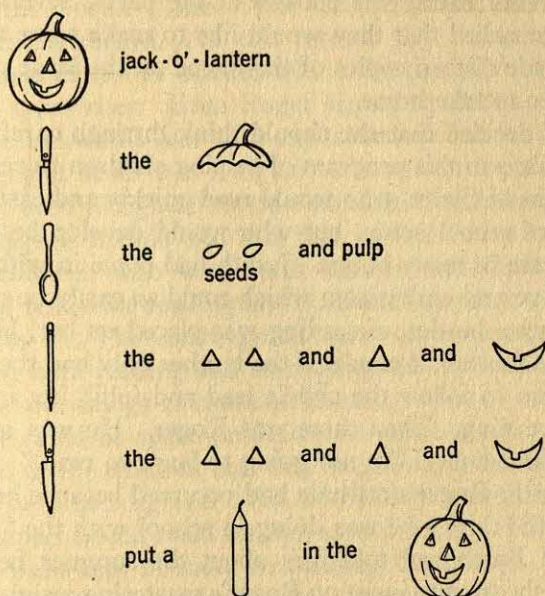
Roger, with the help of the pictures, was able to read these directions from memory, a worth-while achievement for him. Later in the week the group made cookies for their Hallowe'en party, using a recipe printed on a large chart. The words in parentheses were represented by pictures on the chart.

COOKIES

Melt in (double boiler) 2 (squares of chocolate)
Melt ⅓ (cup) of (butter)
Mix ¼ (cup) of (light corn syrup)
    ⅔ (cup) of sugar
    ½ (teaspoon) of salt
    1½ (teaspoons) of (vanilla)
    2 (cups) (oatmeal)

Claire and Judith were interested in this project, as were many of the other boys and girls. Roger showed some interest at first, but soon became impatient and dropped out of the activity. After eating the cookies at the party, several of the children remarked that they would like to make some at home. Miss T made dittoed copies of the recipe on the large chart for the children to take home.

Miss T decided that she should think through carefully just what her aims in this program of helping children to read were. She thought of Claire, who would read quickly and easily under any kind of school setup, but who would develop best with a rich program of many books. Judith had come in with a great deal of drive and enthusiasm which could so easily be quenched if too heavy a burden of reading was placed on her, but which could be so fruitful of results if the teacher only had the courage and wisdom to follow the child's lead and fulfill her individual needs in reading. Then there was Roger. He was no longer saying, "Remember, I'm not going to learn to read." Much of the change in Roger's attitude had occurred because he did not associate the things he was doing in school with the "reading" his friend Butch had told him about the summer before. If, however, she tried to insist on Roger's mastering a sight vocabulary, reading at least through the preprimer, doing pages from a workbook each day, all the old antagonism would flare up because he just simply was not ready for that type of reading. Miss T decided that her chief aim was to give each child such experiences in reading that he would go on to the second grade with a liking for reading and with a desire to do more of it in the next grade. She felt confident that each child would learn to read if she and the teachers after her were careful not to cripple the child by demanding too much in the way of skills before he was ready to learn them.

November: The children went on a visit to a turkey farm. They talked about this experience all the way back on the bus. One child thought they should thank the nice man at the farm for the good time he had shown them. From this suggestion

came a fine experience story in the form of a thank-you letter.
Claire decided that she would like to write a letter of her own
to the farm. She wrote this letter with help on the spelling of
some of the words. Three other children copied a short letter
from the blackboard. All the rest of the children carefully
signed their names to a letter which the teacher had typed on
a primer typewriter. Even Roger signed the letter. He wrote
his name backwards and with capital letters for the most part,
but writing it at all was a signal achievement for a child who
could not even recognize his own name in September. A num-
ber of Roger's friends told him that he had "done real good."

The children who were most mature and therefore most
eager and ready for reading had continued to receive daily help
from Miss T. The entire group spent time on active games
associated with reading and on reading the newspaper together
to learn about things of common interest. Miss T now decided
that time could be spent profitably on small-group work. She
suggested to the children that they might enjoy having reading
clubs. The pupils agreed. The 26 children were divided into
four groups. Social relationships as well as the abilities of the
children were kept in mind in forming the groups. After the
clubs were formed, attention was turned to the problem of
what the other children would do while one club met with Miss
T. Roger suggested that they could play games. Claire's re-
action to this idea was that it would result in too much noise.
She felt that she could not read with a lot of racket going on.
At this point Miss T called attention to a number of things she
had put on a table at the front of the room. There were build-
ing materials the child could use at his desk, such as bricks, the
rig-a-jig set, and the Molly Kewls. There were some small
rubber trucks and cars. There was a treasure chest locked
tightly with a padlock. (To open the padlock it was necessary
to find the right key.) There was a spelling board and a print-
ing set. There were word-picture cards and puzzles. There
were some work sheets as well as plenty of paper for painting
and drawing. The children agreed that they could all find
projects to take back to their seats. They further agreed that

projects should be changed only when a club meeting ended because a lot of moving around might disturb the club in session. A screen was used to make a clubroom.

Claire was reading in a first reader, a book which she shared with a friend, who was also progressing rapidly. Judith was a member of another group and was reading on the second pre-primer level. Some of the children in Judith's club had not yet started in a book, so Miss T introduced these children to the Big Book. They were delighted to discover that the stories in the Big Book were about children like themselves. They talked about the boy and discovered that his name was Dick. Since there was no Dick in the room, here was a new name to learn. They enjoyed the picture of Dick sprawled in the leaves, and reached the conclusion that Dick wanted everyone to "Look, look." Miss T found that starting with the Big Book was a definite convenience because it offered a way to hold the attention of the children on a center of common interest. It is hard to hang on to the small, individual preprimers and to keep your place in them and still hear what the teacher and the others are saying. In working with the Big Book, the children enjoyed showing each other at which side of the page to start reading. They had settled this matter in reading the newspaper from the blackboard each morning. It was fun to count how many times the word "look" appeared, and to discover that "Look," while different to the eye, was the same word, except that it started with a big "L." It was of interest to the children to notice that "look" was a longer word than "oh."

Roger was in a group of immature children. These children used a reading readiness book and told Miss T stories about the pictures. They identified missing parts of objects, objects whose names rhymed, pictures that looked alike, and pictures that were different.

December: Judith, and Roger in particular, enjoyed the big Christmas charts Miss T had made. Claire said they were "too easy." Several of the children thought the charts would make a good book to give to their mothers and fathers for Christmas. Miss T suggested that each child learn to read one of the stories

so that he could read it to his mother and father as a Christmas surprise. Each child was to select the story he liked best. Claire and Judith wanted to read the whole book. Roger said that he could not read any of the stories. However, with help from Miss T, Roger did learn to read one of the stories from memory so that in the end he too had a Christmas surprise for his parents. Miss T sent home a newsletter at this time, explaining to the parents some of her ideas about reading. She stated in this letter that children should have at least the first three years in school to learn to read, write, and spell. She added that both parents and teachers should strive constantly to make reading a pleasurable experience for the child. She commented on the books the children were bringing home, and she asked the parents to express their approval when they heard the children read their stories. The parents were told to ignore mistakes. The letter explained that the important thing was to share the child's sense of achievement.

Roger enjoyed the game about Santa Claus at the North Pole played on a board Miss T had made. He identified numbers and was able to recognize a few of the same letters as appeared in his name. Some of the children in Roger's club had by this time developed a small sight vocabulary.

January: Claire had now started in a second reader. When Claire was stuck on a word, Miss T helped her by saying, "Finish the sentence to see if you can figure out the word from what the rest of it says." Claire had also learned to use the clue of finding a "little word in a big word" to help her puzzle out new words. She was able to attack some words phonetically because she now knew a number of beginning sounds and she knew the endings "s," "ing," and "ed." She was gaining independence and was reading silently much of the time.

Judith no longer wanted to go on to a harder book, but rather she was going back and rereading books which she had read word for word earlier in the year. She now read these materials with meaning and expression. She had developed a sense of phrasing, which had been absent before when so many of the words had been unfamiliar.

Roger was dissatisfied with his reading readiness books, especially as the rest of his group had graduated to the first preprimer level. Miss T tried Roger out on a preprimer, but it was still evident that he was not ready to tackle the material. Miss T covered up the words with a piece of colored paper, and Roger made up his own story about the characters and pictures in the book. Miss T wrote down what Roger said and then read the story back to him. Now and then she would take one of the words and write it out in dots. Roger connected the dots to make letters, while saying the name of the word. Roger had finally learned to print his name in a straight line from left to right. He knew how to move his eyes in reading. He could identify simple digits and a few letters. His skills were not impressive, but he found pleasure in working at tasks adapted to his own level. He regretted the days when his club did not meet. Miss T felt that her efforts had been more than rewarded by the excellent attitude Roger had developed toward reading.

During the course of a builder's unit, the children had made a house from the Patty Hill blocks. They had furnished this house with orange crates. Several of the groups decided to write a story about the house. With the help of the teacher, a few children who had enough fine muscle coordination for the job illustrated the story with homemade lantern slides. The story was typed and the slides were made to accompany this material. The advanced readers read the story and showed these slides to the rest of the group. This project succeeded so well that the second grade was invited to see the "show."

February: The teacher constructed a rabbit game to give the children in Claire's and Judith's groups more practice in sentence reading. Each child drew a card which might say:

> I want something.
>
> are something good.
>
> I will jump three.

or

Come here and see.
Come here and see.
I can go.
One, two, three.

This game was played on a board on which was drawn the path to the carrot patch, beset by such dangers as the farmer's fierce dog. There were small rabbits for each child to send along the path according to the directions on the cards.

Judith, in particular, loved the poems the teacher read to the group at the end of rest time. There were a number of favorites the children could say with Miss T. Judith said she would like to have her favorite poems in a book. The children collected and illustrated their favorites to take home for St. Valentine's Day. Claire could read most of the poems. Judith could read all the memorized ones. Roger liked the book, and especially the picture he had drawn, but he had no interest in reading the poems.

March: In working out the spelling of Friday, the children chanted F-r-i D-a-y. Roger exclaimed in an excited voice, "That's a rhyme!"

The janitor caught a bat, put it in a cage, and brought it to the room for a visit. The children easily worked out the spelling of bat. They went on and thought of all the words that rhyme with bat. The teacher said "The bat wove a hat," and the children followed with several jingles of their own. "Let's count and see how many words we have," one child suggested. "Can we count by twos?" Miss T asked. The children found that there were ten words. Another child suggested that they check by counting by ones. Still another wanted to know what bats eat. No one knew. After checking the school encyclopedia, the children were disappointed to find that this information was not given. Several children reported that they had encyclopedias at home. They promised to consult these books to find out what bats eat. Claire arrived next morning with this information printed in manuscript on a three-by-five filing card:

Baby bats drink milk from their mothers.
Grown-up bats eat insects.

Roger came to reading club with a first reader. The teacher helped him, but he was unable to read it. He then said with a catch in his voice that his mother thought he should read it, that Judith was reading it. Miss T explained that reading was like all other parts of growing up—each child did it differently. Roger had not lost his first teeth, he did not weigh as much as Judith, he was not as tall nor as old as Judith, so why should he be expected to read as well as Judith. Miss T reassured Roger that he would eventually grow in reading as he did in everything else. She then talked with him about his fine work in carpentry and block building.

Miss T later talked with Mrs. M and once more asked her cooperation in helping to make sure that Roger felt successful in what he was doing. Miss T tried to contribute to Mrs. M's own security by explaining that Roger's problem was merely that he was a slow grower. During the course of the conference, Mrs. M remembered that reading had been hard for her and that she had not learned to read until the second grade either.

April: Claire read many of the captions at the showing of the film strip "The Rabbit Who Wanted Red Wings." Judith, by this time, was engaging in much independent reading at library time and at rest time when the children were privileged to take a book with them while they rested on their rugs. Roger could now read a simple preprimer with help from Miss T.

April was the month for standardized testing. Claire tested at the third-grade level on the Gates Primary Reading Tests. Judith tested slightly above her chronological age. Roger tested below his age. Roger did not like the testing. He thought the tests were too hard, but he stuck it out valiantly with the rest of the children.

May: While the children were studying cowboys, Claire, Judith, and Roger all made scrapbooks. Claire made up her own stories for her book and printed them. She needed only occasional help on spelling words. Judith copied two stories she had made up with her club. Roger wrote single words in his book. He had now established a small sight vocabulary, but

he probably would not retain many of the words over the summer vacation.

All three children enjoyed the reading game of roping steers. The steers were in a corral and had letters, words, and phrases fastened to them with paper clips. A magnet was used to rope the steers. Miss T maneuvered the game so that each player roped the steers he could identify or on which he needed further practice.

June: The month for final evaluations had come. Miss T reviewed the year in her mind. She was reminded of her aim to help each child to feel successful, to enjoy reading, and to look forward to more reading in the second grade. She had not tried to make every child reach certain minimum standards of number of books read or skills attained. Yet many of the children, by virtue of their maturity and readiness for reading, had attained skill and were reading at the second- and third-grade levels, according to standard tests. By any yardstick, therefore, Miss T believed that her program of easy, individualized reading had to be rated a success.

Miss T felt a warm glow whenever she thought of Roger. He was still at the very beginning stage of reading. He would undoubtedly have to start in a preprimer in the second grade. The important thing is that Roger was prepared to begin at whatever level was necessary. He felt no antagonism toward reading because of past failure. Roger's feelings are best expressed by a story which his mother told Miss T. One day in June, Mr. and Mrs. M had taken Roger and his friend Butch for a ride. On the way they passed Roger's school. Roger immediately cried out, "Daddy, let's stop. I want to show Butch my wonderful school."

SUMMARY

As was pointed out in Chapter 6, all the conventional methods of teaching reading have their strengths and weaknesses. The suggestion was made, therefore, that reading might best be taught by a combination of methods. The present chapter has shown how all the methods may enter into a bal-

anced program. The start can perhaps be most advantageously made with the experience-reading method. The experience method serves the functions of the story or sentence method. These functions include (1) transmitting the idea of reading, (2) developing a thought-getting attitude as a first step to reading, and (3) arousing an interest in reading. The pupils are next introduced to their preprimers. The vocabulary of the preprimers is usually taught by the word method. The use of the word method at this point will serve to check the habit of memory reading which is associated with experience reading, and to launch the children on the road to real reading. The alphabet and phonetic methods are next called into action to promote skill in word analysis. These methods will serve to counteract the inaccuracy which characterizes learning to read by the word method, and they will also help the children gain independence in word recognition. Quick recognition drills are often useful at this point to keep the pupils from becoming too analytical in their word recognition. Many of the children will now be reading word by word. The phrase method is brought into play at this juncture to combat that problem. The next chapter discusses the question of the measurement and evaluation of achievement in reading.

Chapter 8

THE EVALUATION AND MEASUREMENT OF ACHIEVEMENT IN READING

Introduction

It is now generally recognized by students of the subject, as well as by many parents and other laymen, that the teacher's evaluation of the pupil's progress in learning to read should not be limited to appraising specific skills but should also be concerned about the influence of her instruction on the development of interest in reading, of a taste for good literature, and in general should be directed to determining the effects of reading and learning to read on the pupil's development. Thus, to cite but a single example, Russell, in a discussion of the problem of evaluating pupil growth in and through reading, writes: "Since the aims of the reading program have been enlarged beyond mere literacy . . ., it follows that a modern evaluation program in reading deals not only with reading skills but with more general competences, interests, tastes, and effects of reading on the child. This means that hearing a pupil read orally, giving him one standardized achievement test of reading, and assigning him a grade on a report during the term does not comprise a complete evaluation program in reading" (288, pp. 284-85).

It is also recognized that children may learn the techniques of reading and yet make little or no use of them, except when required, and may never acquire the love of reading which Burton Rascoe (268), among others, has described as life's greatest pleasure. Even so, it can hardly be said that well-established techniques for testing the acquisition of the various skills requisite for reading, as well as other appraisals of the pupil's progress, should in general affect other than favorably

the taste for and interest in reading or the subsequent use of this greatest of all the tools of learning. Furthermore, it should also be recognized that unlike the apparent aim of the so-called "finishing schools" of the recent past, learning to read and learning from reading is a continuing process which is not "finished" in the elementary school, high school, or in college years, and that whatever the attitudes may be in the beginning stages of reading, an interest in reading for its own sake or for what it may do for the individual may develop at any time during the individual's life span.

As to the relative importance of the teacher's mark, the standard test score, and the interest, etc., inventory, the following may be said: (1) Despite the great strides which have been made in recent years in the field of educational measurement, measurement has not replaced the competent teacher's judgment of the individual pupil's progress in learning, although it has sometimes done so in the matter of estimates of the status and progress of *classes* of pupils, and has unquestionably bettered the judgment of teachers in this latter respect. (2) As will appear later as this chapter develops, measuring instruments are not ordinarily reliable enough by themselves to gauge adequately the attainments of individual pupils, even on the fairly objective matter of reading skills. They are much less reliable in such a subjective matter as the pupil's interest in reading and the "effects of reading on the child." Questionnaires of pupils' interests and activities, book lists for the study of the pupil's reading preferences, and rating scales, for example, of the ability to evaluate materials read and to discriminate between "good" and "poor" books, may be of value chiefly in helping teachers to be more systematic in their evaluation. (3) Finally, a teacher's mark usually does in itself include some appraisal of the interests and personalities of the pupils in her charge.

With due recognition, then, of the contributions which may be made through the paraphernalia of interest inventories and rating scales of the personalities and the experiential backgrounds of pupils, this chapter will treat primarily of the teacher's appraisal of reading skills and the extent to which tests and

measurements of reading may supplement and refine this appraisal of the pupil's progress.

The Teacher's Appraisal of Reading

The experienced teacher of reading is constantly evaluating the progress and attainments of her class and its individual members in terms of the objectives and expectations which she has in mind for her class, or such as are set forth in the course of study of the school system in which she is functioning. Even the inexperienced teacher, who may be following, perhaps too slavishly, the manual of instructions which accompanies a particular series of readers and workbooks, may appraise fairly well the progress of her class as a whole and the variations in performance of its individual members.

She may observe that John, whom she regards as a bright boy, gets along all right in reading familiar words, but seems helpless when he comes upon a strange word, and she may then decide that the boy needs drill in the techniques of word recognition. Here is Tom, whom she regards as rather slow-going in all activities, both mental and physical. He reads well orally, spells well, knows how to tackle a new word phonetically, and can usually, *given time,* deduce its meaning from the context. Yet he reads so slowly and laboriously that by the time of a story's ending he has forgotten its beginning. The teacher's appraisal makes note of Tom's liabilities as well as of his assets, and in attempting to better the one she will also try to preserve the other. She may simply try to speed up the boy's visual recognition of words, phrases, and sentences by the use of the familiar flash cards. Or her prescription may be the reading, for a time, of easier materials with fewer new words and more familiar words, but still at his interest or age level. She may thus use books with simplified vocabulary, with the admonition, if not to skim, to get a general impression of what the story is about or what the gist of the discussion is. Then, weeks or months later, the teacher has, of course, the task of reappraising the situation to see whether or not her prescription has been effective.

Finally, to take only another example, here is Mary, the appraisal of whose difficulties will require quite the opposite treatment from that of Tom. She is a voracious reader, finishes a good-sized novel within a few hours, with a fair idea of the plot, but she is an abominable speller and cannot pronounce many of the words, the meaning of which she grasps in the context. Her oral reading is pathetic and she stumbles over words, some of which she actually uses correctly in her everyday speech.

The appraisal of the problems of John and Tom show them to be of the garden variety, and to meet them, the teacher can usually, to mix figures, draw the proper remedies from her bag of tricks. Mary's troubles are more unusual and require more analysis and insight on the teacher's part to understand or to appreciate why perfectly good methods may go awry in individual cases.

A similar case has been described by one of the authors in a discussion of the place or use of tachistoscopic (or flash-card) methods in both the appraising and remedying of some of these pupil deviations. In this instance, the skill of the pupil, a thirteen-year-old boy, in getting meaning out of his visual perception of words and phrases "had so far outstripped his ability to associate the visual perceptions with their sounds . . . that he had become a scholastic problem" (73, p. 16). The "pass" to which he had now come might be catalogued as an abuse of the sentence or paragraph method of learning to read.

The following is an excerpt, with some changes, from a report on a clinical examination of the boy:

In the vocabulary test of the Stanford Binet intelligence test, David read "gown" as "grow," "scorch" as "scotch." This inaccuracy of single word recognition was also found in the word pronunciation test. David is an inaccurate word-whole reader. He read "ignorance" for "innocent," "conference" for "circumstance," "conschentially" for "consequently," "persecution" for "persecute." In context, David seems to know what all these words mean, and would race through them. The same inaccuracy of word recognition and recall is evinced in his spelling.

David is, because of his wide visual span as contrasted with his narrow auditory memory span, one of the most interesting cases we have

seen. For example, in the tachistoscopic exposure of sentences, he read the phrases "in the valley of the Sacramento," and "biting off the tender (green) shoots." Although he missed the word "green," note that his span is even longer than if he had got the word "green" and not "shoots." "This is slower than that of" is another example of his wide visual recognition span. A pupil whose span is limited to a word or two at a time would have great difficulty with such a phrase, but David got it in one exposure.

In the examination, David was somewhat voluble and rambling, and it was sometimes difficult to keep him at the task. He often answered questions without much thought, and seemed to have a sort of careless, hasty attitude toward reading, better described as skimming than reading. David told me that he could read a two-hundred page book in a couple of hours.

David failed almost completely in the rhyme test when he had to look at a list of words and find the rhymes for them in another column. When the words were read to him and pronounced accurately, he had no difficulty in finding the word with which the given word rhymed. I interpret this to mean that he depends upon visual imagery and has a minimum of auditory association. Of course, if David reads "slaughter" as "slafter," it would rhyme with "laughter." Thus when he is asked to give the sound of a word, he may well give it inaccurately because he has never pronounced it.

He has brought along with him one of Joseph C. Lincoln's tales of the sea (the boy came from Cape Cod) which he had read and finished coming up on the train to the clinic.

What David needs now is to do a good deal of reading aloud to increase and make more accurate his recognition of individual word forms. I also recommend practice on the typewriter for this purpose.

STANDARDIZED TESTS OF READING ACHIEVEMENT AND SOME OF THEIR LIMITATIONS

Thus by having the pupil read aloud, by the use of rhymes and flash cards, by having him answer questions orally and in writing, or by having him choose right from wrong answers or statements, the teacher may make very useful appraisals of pupil progress, but these exercises are not regarded as measurements. What more does measurement add, imply, or involve? Chiefly, somewhat greater objectivity, and especially *standards* by which

the average achievement of a class and the individual deviations therefrom are defined.

To illustrate, we may cite first, as among the simplest of oral reading tests, the Gates Word Pronunciation Test and Gray's Oral Reading Paragraphs Test, and secondly, some examples of what are known as *survey* tests of silent reading.

Tests of Oral Reading.—*Gates Word Pronunciation Test* (125, p. 591). The Gates Test consists of 80 words, beginning with rows of two-, three-, four-, five-, and six-letter words, such as *so, we, may, net, came, east, broom, point, window,* and ending with such words as *affectionate, philosopher,* and *treacherous.* The score is the number of words correctly pronounced, and the significance of the score is determined by grade norms, e.g., a score of 49 indicates that the pupil has done as well as the average third-grader by the middle of the year (i.e., 49 = Grade 3.5).

Gray's Standardized Oral Reading Paragraphs (140). Gray's Test consists of twelve paragraphs. The first paragraph begins with the sentence, "A boy had a dog," and the last paragraph ends with the sentence, "Before relatively accurate principles could be established, physicists, mathematicians, and statisticians had to combine forces and work arduously." The paragraphs are "standardized" to the extent that the scores, which are in terms of time taken to read and number of oral errors made, can be interpreted by age and grade norms. These norms were, of course, established by trying the test out on pupils from the first grade up.

The Question of Meaning. Such tests as these sample a prerequisite or aspect of reading, but they are, strictly speaking, not tests of reading but only tests of the extent to which pupils can visualize and correctly pronounce individual words or words in sentences. If the words which the pupils look at and pronounce are words which they understand when they speak them or hear them spoken, these words will ordinarily have *meaning* for them. The pupils may then be said to have read them.

This desideratum does not always, of course, follow. Pupils often pronounce words correctly without understanding them. Such pupils are known as "word-callers."

To make, then, the above tests, tests of oral *reading,* questions or exercises to elicit the meaning of what was read would need to be added. This has been done more generally in the tests of *silent* reading. The simplest method to test silent reading would be to ask the pupil, after he had read a paragraph, page, or story, questions which he could answer *orally,* such as, What did the dog do? What did Mary say? and Why did she cry? But in order to standardize such a test, the answers would need to be recorded and then compared with a compilation of answers which the average six-, seven-, or eight-year-old child, in the average first, second, or third grade, say at mid-years, would have made to these questions. This obviously would be a tedious process. It could be done for an occasional pupil *if* some devoted enthusiast for measurement had performed the laborious task of compiling and standardizing the answers in the manner just noted.

With such laborious methods, the measurement movement would have toppled to the ground from its own weight. How then may matters be simplified? If the reader will now ask himself this double-headed question as to (1) just how he is going to find out how much and how well the individual pupils in a class understand or comprehend what they have read silently, and (2) just how he is going to make it easy for the teacher or tester to *score* the findings in terms of age and grade norms,[1] he will come to understand why the tests of silent reading are as and what they are, and why they have so many shortcomings or limitations.

First, shall we have pupils write out answers to a lot of questions? Such a method would involve legible writing, recognizable spelling, and a certain amount of skill in composition, with the result that the exercise is no longer *just* a test of reading.

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[1] The importance of this aspect of testing, and its influence on test construction, may be seen in the advertising of the recently revised California Reading Tests (a revision of the Progressive Reading Tests). "Scoreze" is the newly coined word to signify easier administration and faster scoring.

(We will say nothing about the long lists of possible answers which we would need to have for comparison in order to decide whether the given answers were those of an average first- or third- or fifth-grader.) If the pupil doesn't write out the answers, he must *do* something else to indicate how much and how well he has understood, and that something may make the test (1) just so much less a simon-pure test of reading and thus in part a test of something else beside reading, or (2), and quite as important, a test of only one aspect or phase of reading. To illustrate, we may now turn, as above noted, to examples of the so-called *survey* tests of silent reading.

Survey Tests of Silent Reading.—*May Ayres Burgess Scale for Measuring Ability in Silent Reading* (42). One of the earliest, simplest, and from the point of view of this chapter, most informative, of these tests is the May Ayres Burgess Scale for Measuring Ability in Silent Reading. It is also one of the least expensive of tests, costing only about one cent per copy. The test consists of a series of twenty pictures, each with a paragraph of directions beneath it. As the directions to the children indicate, "each paragraph tells them to do something to the picture above it with their pencils" in the *"exactly* five minutes" allowed. The picture-paragraph combination is intriguing, interesting, and motivating, as the following samples will show, but the laurels are for the swiftest, not only in the matter of reading but also of drawing. The pupil must not only read as he runs but also run as he draws. A little "dawdling," or more importantly, a little extra care and precision in drawing, will use up some of the precious five minutes. Some children don't like to be, or are not easily, hurried in either the matter of reading or drawing, with the result that a test of reading becomes partly a test of drawing and also partly a test of an aspect of personality.

Sample paragraphs are as follows: [2]

Here is a picture of a girl's head. Take your pencil and quickly draw a circle around the picture, to make a frame for it. Do not spend time

[2] From Form PS 2, now out of print. Quoted by permission of the Russell Sage Foundation.

trying to make a very good circle; but draw it quickly the first time; and then go on and read what the next paragraph tells you to do.

This sleepy woman has not yet finished dressing. Take your pencil and blacken one of her feet; so that it will look as if she had put on one of her shoes. Do not blacken the other foot; because, if you do, she will grow lazy, and will expect someone to help put shoes on her feet every morning.

Here is a Turkish gentleman who is running to the store to buy some tobacco for his pipe. You may show what he will look like after he has bought the tobacco, by drawing a cloud of smoke rolling up from his pipe. Draw it very quickly; and make it going up over his head and streaming out behind him.

Here is a sign to hang on the door and show the number of the house. Now take your pencil and draw a string by which to hang up the sign. Make the string with its two ends fastened near the two ends of the sign; and make a black spot to show where the nail is, on which the sign is hung.

From the standpoint of the teacher or tester, the directions and interpretations of results are simple and informative. The tests are easy to give, but a bit time-consuming to score, especially in the matter of deciding just what is and what is not acceptable in the way of drawings. With only a couple of paragraphs about scoring and a single table and a diagram, all on a double foolscap page with the test, the teacher can readily find what credits are to be given. The score is 100 for a child in the third grade who reads fourteen paragraphs and makes the required drawings! Whereas fourteen paragraphs read by the eighth-grader would carry only a credit of 68. The diagram shows the percentage of children who may be expected to receive these various grades. However, no indication is given of the reliability of these figures.

Whipple's High School and College Reading Test (354). From the standpoint of method, *"doing* something" with pencil and paper to indicate that the subject has understood what he has read has its obvious limitations, as when, for example, in the Whipple High School and College Reading Test the sequence of one's thought in reading is interrupted by such directions as:

When you have read this reply, if you think Secretary Hughes approved of the clause in the bill which refers to the Japanese, write "yes" just at the end of his communication; if you think he does not, write "no." While you are reading the reply, underline the adjective by which Secretary Hughes describes the Japanese people.

. . . This is the end of Mr. Hughes' reply: remember you have a question to answer here.

Underline for whom the Cincinnati *Enquirer* would have us remember the immigration laws should be made when it says:

Not many lines before this one there was a "split infinitive." Underline it.

The Chapman Unspeeded Reading-Comprehension Test (57) *and the Holzinger-Chapman Unspeeded Reading Comprehension Test* (174). Another method of finding out whether the subject is "really reading" is to insert, instead of the right word, a word which "spoils" the meaning of the paragraph, the reader having to "spot" the word and cross it out. For example, in speaking of "a man of pernicious habits," there follows the phrase, "these unworthy and *exemplary* traits." This scheme was first used by Chapman in tests of comprehension in reading, one of which has been revised by Holzinger. They require rather the attitude or set of mind of the proofreader than that which characterizes one's usual reading. Skill in the one need not be altogether indicative of skill in the other.

Minnesota Speed of Reading Test for College Students (99). A similar method of checking comprehension is also employed in the Minnesota Speed of Reading Test for College Students. Irrelevant phrases or clauses are inserted into otherwise meaningful paragraphs. One may, for example, be reading something sensible about the Arabs when he is confronted by the clause, "who inhabited Chicago, Illinois."

Stanford Achievement Test (196). The schemes for checking comprehension in the paragraph reading sections of the most widely used tests of school achievement, the Stanford and the Metropolitan, are also not without flaws. Let us consider first the Stanford from the standpoint, let us say, of the free or immediate expression, without interference or inhibition, of what

the reader has grasped of the meaning of a paragraph. Here, for example, are two four-line stories.[3]

> 4. Alice must stay in bed today.
>   Her face feels very hot.
>   She does not want her dinner.
>   Alice is _____.
> 5. The birds are flying north.
>   The snow is all gone.
>   The flowers are blooming.
>   It is_____.

Master John, in the second grade, has got the missing ideas all right. He is, however, pretty awkward in his handwriting; he writes a *"big"* hand and there doesn't seem to be quite enough room in the space allowed. However, he finally comes through with "sik." That doesn't look right. So he erases it and painstakingly, with the aid of his tongue, writes in "well," forgetting to put in the "not." In the next paragraph, obviously "spring" isn't in his *writing* or spelling vocabulary, so he writes in "April" and for good measure adds "May." By this time John feels that he has put in a good day's work and he takes time out, before proceeding to the next task, to see how things are going on in the world about him. By the time he is back on the job, Mary, in the next seat to him, has already neatly written in the missing words in half a dozen paragraphs. Is Mary the better reader? Not necessarily!

In the Intermediate Battery of this series, the paragraph takes on the aspect of a puzzle, as here illustrated: "A mother bird was picking worms out of the ground. Instead of eating them herself, she carried them to her —1— to feed her —2—." The words for which 1 and 2 stand are to be written in spaces similarly numbered at the margin of the page, to make the scoring of the test easier and speedier.

Finally, at the risk of appearing as a carping critic, in the Advanced Battery of the Stanford Achievement Tests, the supplying of the precise missing word may depend not solely on

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[3] From *Stanford Reading Achievement Test,* Primary Battery, Form E. Copyright by World Book Co., Yonkers, N. Y. Quoted by permission.

the understanding of the meaning of the paragraph but on one's previous knowledge or background of experience. For example, if the student already knows what a faraday is, his supplying the missing words in the following paragraph will be more or less automatic; whereas if the student does not know the meaning of the word, his first reading of the paragraph will require a little thinking on his part.[4]

Faraday was one of the most famous of English chemists and physicists. His great —38— rests principally upon his discoveries in electricity and electromagnetism. A unit of measurement of electricity was given the name of this great scientist; that is, it is called a —39—.

Metropolitan Achievement Tests (5). The reading section of the Metropolitan Achievement Tests starts, in the first grade, with about the simplest way of checking the meaning of a word or the comprehension of a phrase, by drawing a line from a word, such as "mouse," or from a phrase, such as "a smiling face" or "the farmer is digging," to the appropriate picture. The only requisite here is that the pictures be unambiguous. It is conceivable, though admittedly unlikely, that a group of happily running children might be identified as "children going to school" instead of the expected choice of a dour line of children walking toward "a hole in the wall" or door of the schoolhouse. (See Primary I Battery, Form A, revised, p. 5.)

The test of comprehension in the second and third grades is of the meaning of sentences like "Mew mew, says the————," the choice in this case being between pictures of a dog, a horse, a hen, and a cat. "Mother bakes the cake in the————" is another example, with the choice in this case being between an old upright piano (now seldom seen by children), a cake with candles, an automobile, and an "upright" gas range. It wouldn't take too great a stretch of imagination to confuse the "uprights." (See Primary II Battery, Form A, revised, pp. 1-2.)

The transition in this Metropolitan test to sentences requiring completion by the choice of words (such as, "The cow gives————" eggs, silk, mush, milk) and then to paragraphs,

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[4] From *Stanford Reading Achievement Test*, Advanced Battery, Form F. Copyright by World Book Co., Yonkers, N. Y. Quoted by permission.

followed by sentences requiring a choice of words, phrases, or clauses, is a very simple and natural one. This method is continued in the overlapping test for grades three and four.

In the tests of the Metropolitan series thus far discussed, there is relatively little interference with the expression of meaning by the test method. Beginning with tests for the fourth, fifth, and sixth grades, however, the method employed is one which has already been criticized in the review of the Stanford Reading Test, of having to supply a missing word and *write* it on the margin of the page. Sometimes the word may be found in the text, sometimes not. In any case the poor speller may be counted on to comb the text in the hope of finding out how to spell the word. The use of this method is continued in the test for the seventh and eighth grades, and then is replaced towards the end of the test by "clean" paragraphs in which there is none of the —34— and —35— or Chinese puzzle effect. Questions which can be answered in a word or two follow the paragraphs.

A final double-headed comment may be made as to this question-and-answer method of testing comprehension. (1) The "smart" pupil who is out to "beat" the test may read the questions first and rapidly check the paragraph for the answers, and why not? (2) Some of the questions can be answered by the well-informed student or specialist *without reading the paragraphs at all*. This is not a criticism solely of this particular test. It is true of a large number of tests which use the question-and-answer method. It is also not necessarily a criticism of the method, but of the careless way in which the method is sometimes used. It is, however, a limitation of the method because of the difficulty of choosing questions which adequately test the subject's comprehension of what he has just read, but which are not answerable from general knowledge or experience. The reader may well ask here, "What difference does it make?" Here is one example. There have been tall tales (e.g., *Time,* August 1, 1949, under "Education") about how, by "taking thought" or using a particular method, one may increase his speed of reading, usually with the assurance of keeping comprehension "constant." An army captain, after a short period of

such training, was reported to have increased his speed of read-ing from 584 to 1034 words per minute. Would it not be pertinent to inquire what means were employed to check his comprehension, and if it was by a method of questions and answers, multiple-choice, or true-false, how many of the ques-tions he could have answered without reading the text at all?

What is the way out of these dilemmas of the testing methods? One is not to assume, to repeat a part of the quota-tion from Russell in the introductory paragraph of this chapter, that *"one* standardized achievement test of reading" gives an adequate appraisal of every pupil's reading. Why not, then, use two tests, especially if the second test employs a different method of testing comprehension? Better still, perhaps, correct, supplement, and interpret the test results by the informal and often more direct and individual methods of appraisal discussed earlier in this chapter.

Dearborn-Westbrook Silent Reading Test (78). As an ex-ample of the necessity of using many methods of appraisal, one of the authors, with the collaboration of a graduate student, once constructed for "instructional purposes only" [5] a silent reading test in which five different methods were used to check the comprehension of the passage read. In an occasional in-stance, when four of the methods indicated inadequate or poor comprehension, the fifth showed that the pupil had, so far as that method went, *perfect* or nearly perfect comprehension of the passage read. It is not without its own shortcomings, but it will be discussed as an example of some of the desiderata of good testing. Many of its features are of course common to other tests, but not all of them, for the reasons suggested, are to be found in any single battery of tests.

The material to be read in this silent reading test is that of a short story. A story has some obvious advantages over a series of disconnected paragraphs. It is usually more inter-esting and more like the sort of reading to which the pupil

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[5] The time taken to correct the test would exclude it from the class of "Scoreze" tests, and hence quite properly from general group use, although it can be and has been used for individual or clinical appraisal. A complete copy of the test is reproduced in the Appendix.

is accustomed. The story is prefaced by a short paragraph which indicates (1) *what* the story is about, (2) *how* it is to be read, and (3) the *purpose* of reading it, to wit "This is a story of an Indian, a hotelkeeper, and his gentleman guest. After you have read the story, we shall want to see if you can tell what it is about, and especially what the Indian did." This paragraph is read aloud by the class in unison with the examiner. The following paragraph, which introduces the story, is read silently, but the page to the rest of the story is not turned until all or practically all of the class have read the first paragraph so that all may get a fair start and the rate of the reading of the rest of the story may be timed.

The unique feature of the test, as noted, is that the extent of comprehension of the story is tested in five different ways. To begin with, the story is retold in brief with "all but the first letters of certain words left out." The first requirement is thus a "fill-in" or completion test. Then follows a series of twenty pictures, some of which "tell the story" while others do not. The third part of the test is a "multiple choice" in which the pupil chooses the best answer to each of a series of fifteen questions. The fourth part of the test consists of a digest of the story which is printed with no spaces or "leading" between words, the requirement being to draw lines between the words. Good readers have little or no difficulty in recognizing and separating the words. For the poorer reader, many of the words are run together into strange word wholes, as "topofa" or "madeafire." In a similar fashion, one of the authors (71) has shown that a crude but quick test of a student's familiarity with a foreign language can be made by comparing the difference between his rate of reading spaced and unspaced print in his native language with the difference between his rate of reading spaced and unspaced print in the foreign language.

In the fifth part of the test, the story is again briefly retold. This time a baker's dozen of wrong words have been substituted for the correct words of the story, the requirement being to cross out the wrong words. This section of the test was added to illustrate another method of testing reading by the deletion of inappropriate words, but also to leave a pleasant taste in the

reader's mouth or to inculcate the notion that "testing can be fun." Usually, when a ripple of laughter has started in the classroom, it appears to stimulate the prodding readers to find out where and what the jokes are.

Summary of the Survey Type of Silent Reading Tests. In summary of the above discussion of the *survey* type of reading tests, it may be said that despite the limitations noted, the more comprehensive of these tests provide fairly reliable measures of the general level of reading achievement of *classes* of pupils. When it is a matter of determining the level of achievement of the individual pupil, none of these group tests is sufficiently reliable to warrant unchallenged classification of *all* pupils as even "excellent," "good," "average," or "poor" readers. Two reading tests, especially tests which employ different means of checking rate, vocabulary, and comprehension, are ordinarily better than one, but all test results need to be appraised and checked by the judgment of an experienced teacher who is acquainted with the daily performance of the pupils in question.

DIAGNOSTIC OR ANALYTICAL TESTS OF READING

A second type of reading test is called "diagnostic" or "analytical." It purports to analyze and measure the various skills which enter into or of which the general ability to read is composed, and thus to diagnose the liabilities and assets of the individual pupil or of whole classes of pupils. As to just how many of these skills there are and, except for a few, as to just *what* they are, there seems to be little agreement. Traxler (341) found in examining twenty-four different reading tests that forty-eight different kinds of ability were *named*. Table XII lists these abilities, together with the number of tests which were credited with measuring each ability. From an examination of this table it is clear that for some of the abilities, test makers were simply using different names, and that the differences between some of the other abilities, whatever their names, cannot be very great. The most frequently listed are the getting of the meaning of words, getting the meaning (or the comprehension) of sentences and of paragraphs, grasping the central

thought or main idea, the reading (and understanding) of direc-
tions, and the rate of reading. Others in the list of obvious im-
portance are the ability to follow the organization of an article,
to note its details, to draw inferences or to grasp the implications
whether of details or of a general statement, and in general, to
perceive relationships. When a teacher complains that a pupil
knows all the words and seems to understand all the separate
sentences but misses the point of a story, it may be that he lacks
the ability (1) to get the "total" meaning, or the general signifi-
cance; (2) to note sufficient details or (3) to distinguish be-
tween relevant and irrelevant statements; (4) to get the correct
implications or (5) to draw the right inference. Before she
can decide how far the tests can help her in distinguishing
between the above factors and thus in making the "diagnosis,"
she must consider several preliminary matters, and perhaps also,
as will be later advised, get some firsthand experience by trying
out some tests on herself.

Concepts of Reliability and Validity.—There are two con-
cepts which are fundamental in the matter of test appraisal. One
is the *reliability* of the test and the other is its *validity*. For
present purposes we may define reliability as the extent to which
a test (or a test item) is *consistent* in its findings. In other
words, the extent to which, when the test is repeated, or when
another form of the test is used under the same or similar
circumstances, the test will give the same or very similar results,
as in its first use. One of the factors which will make for unrelia-
bility is the time taken. For example, a more *consistent* measure
of a pupil's rate of reading can ordinarily be secured by having
him read for five minutes instead of one minute. The degree
of *validity* of a test is determined by the extent to which it
actually measures what it purports to measure. The extent of
reliability or validity is expressed numerically in terms of coeffi-
cients of correlation, which range from 0 to 1.00. A coefficient
of, e.g., .90 represents a high degree of either reliability or
validity.

The importance of these concepts and related matters in the
appraisal of the diagnostic or analytical tests of reading may be

TABLE XII

Types of Reading Ability Measured
By Twenty-Four Reading Tests

Kinds of Reading Ability	Number of Tests
Word meaning	18
Paragraph comprehension	14
Rate of reading	11
Central thought or main idea	6
Sentence meaning (also questions)	6
Reading directions	6
Story comprehension	5
Organization	4
Use of index	3
Maps, graphs, and charts	3
Word recognition (primary)	3
Interpretation of meaning	3
Noting details	2
Fact material	2
Total meaning	2
Directed reading	2
Location of information	2
Use of dictionary	2
Alphabetization	2
Drawing conclusions or inferences	2
Speed of comprehension	2
Grasp of direct details	2
Grasp of implied details	1
General significance	1
Prediction of outcome	1
Use of references	1
Relevant and irrelevant statements	1
True and false ideas	1
True and false deductions	1
Recognition of form, mechanics, and sequence	1
Comprehension of phrases	1
Reading capacity—word meaning	1
Reading capacity—paragraph comprehension	1
Poetry comprehension	1
Technical vocabulary	1
Foreign words, phrases, etc.	1
Reasons for events or circumstances	1
Comprehension efficiency	1

From Traxler (341, p. 24), by permission of the Educational Records Bureau and Science Research Associates.

Kinds of Reading Ability	Number of Tests
Reading comprehension in biology	1
Reading comprehension in history	1
Reading comprehension in literature	1
Reading comprehension in science	1
Level of comprehension	1
Determining whether definite idea is stated	1
Ability to give references	1
Ability to perceive relationships	1
Range of general information	1
Integration of dispersed ideas	1

best appreciated by reviewing a sample test in some detail. A widely used silent reading test, the Iowa, may serve as an example. An advanced form of the test is chosen, first because the various skills which are sampled can be better recognized and identified at this level than in the earlier stages of reading, and secondly, teachers by reviewing or actually trying out a test at this level on themselves can gain a better idea of the separate skills which it purports to measure and also a better understanding and appreciation of pupil reactions to the taking of tests.

The Iowa Silent Reading Test (144) as a Diagnostic Measure.—The first section of the Iowa Test is one of the rate and comprehension of reading. It is in two parts. In Part A (of Form Bm) the pupil is asked to read a passage of four paragraphs of twenty-five sentences of "science content." In Part B he reads a passage of six paragraphs of twenty-five sentences of "social studies material." At the end of one minute in the reading of each section, the pupil is interrupted to mark the word he is then reading so that his "rate" may be calculated. The pupils are first told that the test is given to find out how well and rapidly they can read. They are then told to read the stories *very carefully* so that they will be able to answer questions about the stories. The total reading time for each passage is three minutes, and two minutes are given for answering ten multiple-

choice questions on Part A, and three minutes to deciding which of twenty-five statements are either true, false, or "not discussed" in the passage.

It will be recognized, in the first place, that the student's rate and comprehension will in part be determined by his previous familiarity with the particular field or topic of science or subject of the social sciences sampled. They will also be influenced by the relative weight the pupils individually give to the instructions that they are to read "rapidly" and at the same time "very carefully." Differences in the pupils' mind set in these respects will produce differences in test results.

Another factor to be considered in appraising the results of the test is suggested by the question, Are the passages themselves, and the three-minute times, both long enough to get results which will be "consistent" with what the pupil *ordinarily* does in reading?

Finally, if the teacher accepts a criterion, first clearly enunciated by Thorndike (319, 320, 321), that reading *is* or requires thinking, the teacher may inquire, as she samples the test for herself, (1) is the content of the sort and of appropriate difficulty to require some thinking on the part of the student, and (2) are the ways and means of appraising the students' reactions or comprehension such as to give preference to the better readers or to favor, for example, readers who rapidly skim and glibly guess?

The present writers hazard the judgment that the passages chosen for testing the rate and comprehension in the Iowa Advanced Test are sufficiently challenging and of appropriate difficulty, but that the passages are not long enough and that sufficient time is not given for determining accurately the average rate of reading of the class, and certainly not that of the individual pupil, and finally that the methods and materials for appraising comprehension may well favor the smart but superficial reader. The basis for this last comment is that the student's comprehension of the first passage read is tested by a series of ten multiple-choice questions or statements, each with three choices, in which a third of the answers could then be gotten right by pure chance or guessing, and secondly, the items

require, for the most part, simply the giving back or the recognition of a word or phrase from the reading. Such an exercise requires little "consideration" on the part of the reader. The reader's comprehension of the second passage similarly requires that the reader indicate which of twenty-five statements are, in terms of the article, either true, false, or "not discussed." Here again there is the chance by random marking of getting eight out of the twenty-five right, and further, an intelligent "nonreader" could, if the questions were read to him, mark a considerable number of the statements correctly. This fact may be demonstrated by having a few intelligent pupils do the exercise *without* at all reading the passage on which they are based. The saving grace here, however, as compared with many tests which require marking only for "true" or "false," is the limitation "not discussed in this article."

In support of the above judgment of the writers, it may be noted that the coefficients of correlation for reliability are as low as .68 or .69 for rate and .72 for comprehension, whereas the reliability of the test as a whole is .91, and secondly, that these reliabilities, such as they are, are obtained by a method (the split half with the usual corrections) which itself is not considered by competent statisticians sufficiently "reliable" for tests where speed of performance is as much a factor as it is in the Iowa battery of tests.

To prepare the way for some further comments bearing on the reliability of the test, and also on the coordinate question of its *validity,* we may now note that the Iowa Advanced Test is composed of six other parts—directed reading, poetry comprehension, word meaning, sentence meaning, paragraph comprehension, and location of information. These parts are referred to as "unit skills." Whether the art or act of reading *can* be divided into seven or any other number of "unit skills" is a question which is not raised by the authors of the Iowa Test, let alone the question of how discreetly they can be measured. Both questions, and especially the latter, will obviously depend on how much overlapping there is between skills.

The "unit skill" called "Directed Reading" samples a useful function, to wit, to find answers to specific questions. There

are twenty of them. The student is directed to read each question and to find the sentence which answers it. Shall the student first skim through the passage, or shall he first read the questions and then try to find the answers in the passage? His rating in the three minutes allowed will be affected by his choice of method.

In the next subtest of "Poetry Comprehension," the student is directed to read the poem first before attempting to answer questions. But a more important issue may now be raised. Suppose a difference is found between the student's comprehension of poetry and his comprehension of the prose passages of science and the social studies. Is it a real difference or is it in part or altogether due to a difference in the method of testing employed? In contrast to the multiple-choice and true-false determinations used for prose, the puzzle now is to find, by number, the phrase, clause, or line in which the answers to twenty questions are given. And are ten minutes of reading and responding in the case of prose, and five minutes of reading and somewhat different responding in the case of poetry, sufficiently long samplings to assert that some individual student reads prose better or worse than he does poetry? It seems a long chance.

The above comments have had a bearing primarily on the question of test reliability or consistency. The coordinate factor, as above noted, which must be considered in the appraisal of any test, is its *validity* or the *degree* to which it measures the skill or skills which it is supposed to measure. Establishing the validity of a test of reading thus involves the defining of what the basic skills are, and then showing how well or to what degree the test measures these skills. This is obviously no simple matter. In the early days of intelligence testing, a distinguished psychologist, perhaps with his tongue in his cheek, got around the matter by defining intelligence as that which the intelligence tests test! The makers of reading tests doubtless long for such an easy solution to the problems of (1) the definition of what reading ability is and (2) the validity of its measurement. The authors of the Iowa Test, which we are discussing for the purpose of illustrating these problems of

measurement, fall back on the opinions of experienced teachers, the recommendations of committees (presumably on the subject of reading), and "other qualified authorities" [6] as to just what reading abilities and skills are. They then give "an outline of reading skills" compiled from these sources, which includes such items as "skill in recognizing new words"; "ability to comprehend quickly (and it presumably goes without saying, although it is *not* so stated in the outline, to comprehend *well*) what is read"; "ability to organize what is read"; and "remembrance of material read."

For a solution of this problem of validity, the authors state their belief that "validity may best be expressed in terms of the extent to which the test sets up situations calling into play the skills and abilities which experienced observers consider fundamental to success in the given field." They then suggest that a "comparison of this list of abilities and attitudes, upon which successful silent reading undoubtedly depends, with the list of unit skills specifically measured by the parts of the test, will reveal the extent to which they represent really valid measuring instruments."

Can test makers do any better than the authors of the Iowa Test have done (and, to repeat, this test is singled out for detailed comment only by way of illustration of the problems involved) in determining what reading ability is and the validity of its measurement? In the judgment of the present writers, the most satisfactory answer to this question to date is to be found in a discussion by Davis (68) of the question of what reading tests *really* measure.

What Do Reading Tests Really Measure.—The following is a brief résumé and discussion of the main points of the article. The first requirement is so to define "reading ability" that the definition will be accepted by authorities or "experts" as adequate and accurate. Thus Davis and the Iowa test makers, whom we have taken as examples, are in agreement as to principle, but taste for authorities may differ! For Davis, the

[6] This and the following quoted comments are from the section on validity in the Manual of Directions for the Advanced Iowa Test.

authorities are, first, Thorndike, whose articles, as above cited, demonstrated that reading is a form of reasoning, and second, Richards (275), who further analyzed the process into four components: (1) comprehending accurately the writer's sense or meaning; (2) determining correctly the writer's feeling or mood; (3) apprehending the writer's exact tone or attitude toward the reader; and (4) recognizing the writer's intention. These four aspects of reading are believed by Davis to "come close to a definition of reading ability that would be widely accepted." Using these conclusions of Thorndike and Richards "as a frame of reference," Davis has "sorted out and labeled" [7] eight or nine groups of skills. The first two, which are the more general abilities, are: (1) word knowledge ("It is perfectly obvious that, in order to comprehend, the reader must know what the words mean.") and (2) reasoning in reading, the latter being divisible into at least two kinds of reasoning: *(a)* "facility in weaving together several ideas to see their relationships, and *(b)* ability to draw correct inferences from a writer's statements, i.e., to go beyond the literal interpretation to the implications of the statements" (68, pp. 182, 183).

With these two or, if we regard, as the author does, *(a)* and *(b)* as distinct, *three* general abilities, six more specific skills are associated, each of which should be separately taught, practiced, and tested. They are (3) "the ability to determine a writer's purpose, intent, or point of view"; (4) "the ability to understand the writer's explicit statements, to get the literal meaning"; (5) "the ability to follow the organization of a passage and to identify antecedents and references in it"; (6) "the ability to select the main thought of a passage"; (7) "the ability to determine from the context the meaning of an unfamiliar word or to select which one of several known meanings of a word is most appropriate in its particular contextual setting" (68, pp. 183, 184).

This seventh skill is one which, according to the author, has "scarcely ever" been employed in the construction of tests of reading. To quote:

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[7] This sorting out was done by the statistical procedure known as "factor analysis."

To a limited degree, most systems for teaching reading to first-grade children encourage the pupils to guess at the meanings of unfamiliar words by using the context. Older pupils do this all the time, and mature readers gradually catch the subtle shadings in the meanings of words by meeting them in many different contextual settings. It seems obvious that this skill, which proves to have a substantial core of unique elements, should be well represented in tests of reading comprehension. Items of this sort really test the meanings of words in context in a way that vocabulary tests, which present the word whose meaning is to be tested in a short phrase or sentence, cannot duplicate (68, pp. 184-85).

The last specific skill in reading is (8) "the ability to recognize the literary devices used in a passage and to determine its tone and mood" (68, p. 185).

Davis makes clear that the above "are not the *only* skills involved in reading"; they are, however, among the more important, and what is of particular importance, they "have been shown statistically to include elements independent of one another." His discussion of the extent to which they are measured by present-day reading tests includes the following statements of particular interest to the primary and intermediate grade teacher:

The skill that is measured most adequately by the reading tests now in use is knowledge of word meanings. Almost every reading test contains at least one section of vocabulary items. Furthermore, the types of questions based on the passages in most reading tests are usually such as to demand little more of the testee than the ability to match words in the passage with words in the items. This means that word knowledge is the principal component of reading ability as it is measured by most reading tests.

It is likely that skill 4 (in the list above) is the one that is measured next best by most published reading tests. Most of the items in these tests call for an understanding of a writer's specific statements and can be answered by reference to the appropriate phrase or sentence. This is an important skill in reading. In the primary grades it can be expected to be almost the entire end result of reading.

A third skill that is measured reasonably adequately by most reading tests is No. 2a in the list above. This skill is usually measured much less adequately than skills 1 or 4, but most tests contain quite a few items in this category (68, p. 186).

Returning with the author to his original question, "What do reading tests *really* measure?" the main part of his answer is

. . . that most reading tests do not measure all the skills in reading that are considered highly important by authorities in the field. The existing tests differ somewhat in the emphasis that they give to the several skills that they do measure. Most of them, however, are almost entirely tests of word knowledge and of the ability to comprehend the literal meaning of the separate statements in what is read (68, p. 187).

DIAGNOSTIC TESTING AND TEACHING IN THE EARLY GRADES

We have been discussing the nature of reading and the problems of the measurement of reading ability, for the most part at the high school and beginning college level. Although we are concerned primarily with measurement in the elementary grades, we have started at this level in the belief that if teachers will try out on themselves tests at or near their own level of reading ability and thus evaluate the tests in terms of personal reactions, they will be much more appreciative of the problems of measurement at lower levels of reading ability. Then, too, the various skills which make up the composite of reading ability are more full-blown and more easily recognizable than they may be in their earlier stages of development.

To turn now to the problems of testing in the elementary grades, Davis, in the analysis of reading skills, as just cited, indicates that except for the knowledge of the meaning of words, the ability to understand the explicit statements or the literal meaning of the writer "can be expected to be almost the entire end result of reading" in the primary grades. Even so, he notes in connection with his seventh skill that "to a limited degree, most systems for teaching reading to first-grade children" require this skill, in that they "encourage the pupils to guess at the meanings of unfamiliar words by using the context." But it must be noted that *the* reason why this skill is employed only to a limited degree in the first grade is not the child's inability to use the skill but, as was observed in the last chapter, that the child lacks context clues by which he can check the

meaning of what he reads. And as also there noted in a quotation from Stroud, "the beginner must start with what is perhaps the most difficult kind of reading, reading isolated sentences." As a result of the recognition of this fact, the methods of teaching reading of the early days have been modified to include the use of pictures and work-experience charts. Why? Because, again in the words of Stroud, "they not only suggest words, as a kind of self-prompting, but they also enable the beginner to check the congruency of his construction." That is, they supply him with the clues by which he may the better use this skill of deriving the meaning of unfamiliar words from the context. Thus it follows, too, that when we come to *test* the beginner's progress in reading, we check his ability to use this skill, as in the Gates and Reilley tests described below, by seeing how well he can associate the word or sentence with the appropriate picture or pictures.

So, as the camel's head once in is followed by his big body, we find these skills, which we can clearly recognize and identify at the more advanced levels, creeping into the methods of learning and teaching and testing at the primary and intermediate levels. We find the advanced primary and intermediate grade teacher asking not only, can the pupil get the meaning of a new word from the way it is used in a sentence and does he understand what the writer is saying, but also many of the following questions: Does the pupil get the main ideas, as well as note the essential details? Can he recognize relationship and organize his ideas? Does he sense the author's mood and appreciate the way the author expresses himself? Does he "integrate," that is, match the ideas which he gets from his reading with his own experiences, and can he apply these ideas to his own behavior and ways of doing and looking at things?

Appraisal of Typical Diagnostic Tests.—These and similar questions, many reminiscent of the skills into which the complex process of reading was analyzed in the above citation from Davis, are the ones commonly found in the teachers' manuals and workbooks from the late primary to the upper grades. Our immediate problem is to inquire in how far the standard reading

tests are diagnostic of these various skills, and thus in how far they may aid the teacher in answering the above questions.

The Gates Primary Reading Tests (123). We begin with one of the simplest of these tests, the Gates Primary Reading Tests. They test in their incipient stages what was stated above to be "almost the entire end result of reading" in the primary grades, (1) the recognition of words and their meaning as expressed in pictures, (2) the reading of sentences, and (3) the reading of paragraphs. These skills are designated as of different types (Types 1, 2, and 3) of reading, although it is obvious that there is great overlapping as between types: to read a paragraph, one must first read sentences, and to understand sentences one must, in general, know the meaning of the words which compose the sentence. On the other hand, it is equally clear (1) that a pupil may know the meaning of the separate words of a sentence and yet fail to get the meaning of the sentence, and (2) that a pupil may get the meaning of the various sentences composing a paragraph and yet fail to grasp the meaning of the paragraph as a whole.

There are three forms of each type, Types 1 and 2 requiring fifteen minutes each, and Type 3, twenty minutes. These time units are considered generous enough so that the results are an indication of power rather than of speed. Age and grade norms are given, but no data on the reliability and validity of the tests, except for the statement that "the tests are long enough to yield reasonably reliable results in the individual cases, and highly reliable scores for a class." For more precise individual appraisal, the author advises the use of two forms of each type.

In the word-recognition test, it is a question of selecting and marking the one word out of four which describes an accompanying picture; for example, beside a picture of a frog are four words: frog, from, drop, flag. There are forty-eight such choices to be made. In each of the tests for sentence reading, there are six pictures, three of which are to be marked by one (I), two (II), or three (III) marks to accord with these sentences; for example: The girl has a book. I (There are pictures of two girls, one with a book and one with a balloon).

The dog is black. II (There are two dogs, one of which is black). This is a little boy. III (There is an accompanying picture of a little boy, as well as of a man). The tests for paragraph reading are in each case a "follow the directions" test, in that the comprehension of the meaning of the paragraph is tested by the pupils' ability to "draw a line," e.g., from the pig to the tree or under the ducks that came last of all. There are in all twenty-six paragraphs.

The Gates Advanced Primary Reading Tests (122) are designed for use in the second half of Grade II and in Grade III. Skill in word recognition is tested in the choice of the one word out of four which describes an accompanying picture. There are forty-eight such groups of four words, and accompanying pictures. The words increase in difficulty from primer words to words at the adult level.

Reading comprehension is tested by twenty-four items which require the marking of an accompanying set of pictures as, for example, "Put an X on." It should be noted that this method of testing may narrow the extent of comprehension tested. Thus failure to follow directions *may* in individual cases only indicate carelessness in marking or poor work habits, and may not altogether be due to defects in the mechanics of reading or of comprehension.

The Reilley Primary Reading Test (272) combines the tests of the meaning of words, of sentences, and of paragraphs into a single test for the primary grades. It also includes a test on the recognition of word forms. The method of testing the meaning of words is the same as that described above in the Gates Test. The meaning of sentences and paragraphs is tested in each case by the device of the one out of four pictures which most correctly illustrates the sentence or paragraph. For example, for "The dog is walking through the gate," the choice of pictures is made from (1) a dog asleep on a mat, (2) a boy walking through a gate, (3) a dog jumping the fence, and (4) a dog walking through the gate. The meanings of eleven sentences and of eleven paragraphs are thus tested.

The Gates Basic Reading Test (121) is comprised of four parts or "types" intended for the second half of the third grade through Grade VIII. Type A, Reading to Appreciate General Significance, *could* require at least skills 2b, 3, 4, and 6 of the above analysis of Davis, but an examination of the materials and method of testing, e.g., "Draw a line under the word that tells what young John received" indicates that only skill 4, "to get the literal meaning," is probed. This is also the only skill required in Type B, Reading to Predict the Outcome of Given Events; Type C, Reading to Understand Precise Directions; and Type D, Reading to Note Details.

No proof is given that the tests measure separate abilities. In other words, evidence as to *validity,* that is, that the tests measure what they purport to measure, is missing. Certain it is that there is a good deal of overlapping as between tests. In fact, the intercorrelations between the tests, as given by the author, the median of which is $r = .83$, indicate this. There is, in fact, almost as much resemblance between types as there is between two forms of the *same* type of test ($r = .89$). It might, therefore, be better to consider these four types of test as simply different ways of measuring the single ability of getting the literal meaning or of understanding explicit statements.

If, on the other hand, a whole class is below the norms in one or two of these types of testing, but not in the others, it may well indicate that the class needs practice in expressing what it has gained from reading in the ways in which it has been found deficient. The same may be true of an individual pupil, only in this case the reliability of the diagnosis of weakness or strength in some one or more modes of expression could be enhanced by following the author's recommendation that two forms of each test be given in individual cases.

Norms for what we suggest may be only different ways of testing the single ability of getting the literal meaning are given in terms of reading age and grade, accuracy scores, and the speed of reading. Speed is measured by the number of paragraphs attempted. In interpreting these norms, it should be noted that the materials of the test are of about third-grade

difficulty, and that hence a score equivalent to, e.g., the average seventh-grader does *not* mean that the pupil can read seventh-grade materials but only that he can read materials of third-grade difficulty as well as the average seventh-grader can.

It should be added that the paragraphs in all the "types" are, in general, interesting, even intriguing, to their young readers. Type A is given eight minutes in Grades III and IV and six minutes in Grades V and above. The other types are given ten and eight minutes in the corresponding grades, making an over-all time of 38 to 30 minutes.

The Nelson Silent Reading Test (239) is designed for use in Grades III to IX. It has two parts, a vocabulary test of 100 words, chosen from the Thorndike Word Book and the Horn Basic Writing Vocabulary, and a test of paragraph reading. The paragraph test is said to measure three of the "phases of reading ability," just discussed in the Gates Basic Reading Test, that is, all but the reading to understand precise directions. No evidence is given as to the validity of the measurement of these three phases of reading ability.

The questions which purport to measure these three phases of ability are based on the same paragraphs, whereas in the Gates Test, different paragraphs were used for each type. That each phase is measured by the same material is regarded by the author as a distinctive and presumably advantageous feature, which it might be if these various "phases" of reading ability were shown to be "distinctive" and not simply, as above noted, different ways of measuring in how far the reader had grasped the meaning of the paragraphs.

The test, as a whole, has reliability coefficients, as measured by different forms of the test given to the same pupils, averaging about .90. Age and grade equivalents of the various scores are given. Since the paragraphs in the Nelson Test are of an increasing order of difficulty, a score equal to that of the average seventh- or eighth-grader indicates, in contrast to the paragraphs in the Gates Basic Reading Test, that level of reading ability for the sort of materials read. However, the paragraphs may be characterized as largely descriptive and narrative, and may not,

therefore, give accurate standards for the reading of different kinds of materials such as are found in, e.g., the science text-books of the upper grades.

The Pressey Diagnostic Reading Test (264) is also designed for Grades III to IX. It is the first test of those thus far reviewed to include the word "diagnostic" in its title. What it diagnoses is the extent of vocabulary, the speed of reading, and the "pupil's grasp, as wholes, of units of thought larger than the sentence," to quote from the author's manual.

There are two somewhat unique features. Instead of finding how many words are read silently in a minute or two or at most in a few minutes, sometimes without any measure of comprehension, as is done in some reading tests, a ten-minute test of eight pages of 3,300 words, with easy and quickly marked questions inserted in the story to give at least some check on comprehension, is employed. It must be said, however, that the questions do interrupt the narrative and might well prove annoying to many a youthful reader. Further, the story is of only second-to-third-grade difficulty, so that, when it is stated that a youngster is reading, e.g., from 300 to 400 words a minute, it is to be remembered that they are very simple words. The authors suggest that the test may be useful in locating readers who "are seriously slowed by persistence of oral reading habits." In view, however, of the unseemly haste of some testers and of some teachers to rid pupils of any vestiges of these habits, it needs be said that when the materials of reading are more difficult, and the requirements of comprehension more exacting than in this test, the "persistence of oral reading habits" is often a boon for the understanding of even many a mature reader.

The second feature is the method employed in the "paragraph meaning test," which requires the underlining of a topic sentence in each of sixty short paragraphs. The pupils are told that there is one sentence in each paragraph which tells what the paragraph is about or the most important thing in the paragraph, as in the following example, of which there are several for practice: "The snow had melted. The sun was warm on the

hillside. *Spring had come.* Already a few flowers had been found." This is a valid and reliable test of the sixth ability of Davis, as listed above, namely, to select the main thought of a passage.

The Sangren-Woody Reading Test (292), designed for the fourth to eighth grades, samples more of the above-listed skills than any test thus far examined. The test is divided into seven parts: (1) Word meaning. (2) Rate, in which "the child is asked to read as rapidly as he can understand what he reads," his rate being determined by the number of words read in the first minute. (3) Fact material, in which brief answers are required to twenty questions on the exact facts in a 425-word article on (in Form A) "Is it lead in your pencil?" This is a good test for skill 4 of "understanding a writer's explicit statements." (4) Total meaning, in which there are a dozen short paragraphs, followed by such questions as, "What word best describes the scene?" "What is about to take place?" "Where were the boys going?" Four choices of single words follow the questions, as for example to the last question, city, ball game, store, camping. These questions sample, in addition to ability No. 4, especially abilities Nos. 2a and 2b (reasoning in reading) to weave together several ideas to see their relations and the ability to draw correct inferences, to get the implications of statements. (5) Central thought, a test which is similar to the Pressey paragraph meaning test, except that the topical sentence is chosen from four alternatives, and which samples, in ten paragraphs, skill No. 6, "to select the main thought." (6) Following directions samples skill No. 4, to understand explicit statements and get the literal meaning. (7) Organization, which measures to some degree skill No. 5, the ability to follow the organization of a passage. The task is mainly, however, to select the right "order" rather than the right organization of events. This leaves only skills Nos. 3, 7, and 8 unsampled.

The chief criticism of the list as a whole is the short time allotments; two minutes only for "total meaning," which is perhaps the best test of the lot, three minutes for "fact material,"

and five minutes for "central thought." A disproportionate amount of time (eight minutes) is given to "organization." These are undoubtedly correct time limits for the present number of test items, but for reliable measures of parts 3 and 4, and probably 5, more test items need to be added.

Other tests—and we shall not attempt to enumerate them all—which test or purport to test several of the basic reading skills, are the Progressive Reading Tests, some of which are now being revised under the title of the California Reading Tests, the Van Wagenen-Dvorak Diagnostic Examination of Silent Reading Abilities, and the Shank Tests of Reading Comprehension.

The Progressive Reading Tests (325) consist of a Primary Battery for Grades I to III, an Elementary Battery for Grades IV to VI, an Intermediate Battery for Grades VII to IX, and an Advanced Battery. In the part dealing with Reading Comprehension of the Primary Battery, there are three sections, namely, Following Directions, Directly Stated Facts, and Interpretations. The reliabilities of these sections are not published, but in view of the short amount of time given to each, they are presumably not very high.

In the new 1950 edition (326) for the intermediate grades, the reading comprehension skills sampled are those of Following Directions, Reference Skills, and Interpretations, to which eight, five, and twenty-five minutes are respectively given. From the standpoint of time, the reliability of the subtest, Interpretations, should be high. However, the fact that the authors advise in their manual that the scores in the separate sections of the test "should be used only as guides to indicate the presence of student difficulties" would suggest, in general, low reliabilities.

The Van Wagenen-Dvorak Diagnostic Examination of Silent Reading Abilities (344) has an Intermediate Division for Grades IV and V, a Junior Division for Grades VI to IX, and a Senior Division. Outside of rate and vocabulary and a test of the range of information, the reading abilities are listed as (1) the perception of relationships, (2) grasping the central

thought, (3) the grasping and retention of clearly stated details, (4) the interpretation of content, (5) the integration of dispersed ideas, and (6) the drawing of inferences from content. These are "power" tests, with no time limits; but for one part, an allowance of 45 minutes, and for a second part, one of from 60 to 90 minutes, is suggested. This length of time would seem sufficient to assure adequate reliabilities for these various abilities, provided that they are really separate or fairly independent abilities. Until such evidence is forthcoming, the diagnostic value of these subtests must remain in question. Traxler (340) has found, in the case of independent school pupils (and he notes that the findings may not hold for public school children), that the reliabilities of several of these subtests were too low for the purpose of diagnosing individual pupils, and that the comprehension scores did not indicate independent abilities, since they were highly correlated.

In the *Shank Tests of Reading Comprehension* (299), diagnostic charts are provided for six to seven "types of response" to questions directed at the following somewhat different aspects of reading ability: (1) answering a direct question on content details; (2) answering an implied question on content details; (3) answering an implied question on content meaning as a whole; (4) determining whether or not the content stated a given idea; (5) selecting words or thoughts to which given words refer; (6) determining whether given statements are true or false; and (7) giving a word from the content that is synonymous or similar to a given word. This last type of question is used only in the upper-grade tests. Evidence as to the reliability and validity of this particular analysis of reading ability is again lacking.

To What Extent Are Diagnostic Tests Diagnostic.—The above review of representative tests has given the answer to our original question as to how far reading tests are diagnostic of the various skills of which reading ability is composed. As yet there are but few clear-cut answers, and teachers must supplement the test results by their own experiences. As above noted, when whole classes show a sizable deficiency or excel-

lence, on the average, in some one skill, the finding may be accepted with some assurance. In individual cases, using two to three forms of the same type of test will give a more trustworthy but still not always definitive answer.

Thus for diagnosing the idiosyncrasies of the individual pupil, the shortcomings of the diagnostic tests are still more evident than those which aim to establish only his general level or the "average" of his reading skills. The diagnosis, such as it is, of the individual's assets and liabilities may, however, still be of value to the teacher as suggestive of areas where her own observations or judgments may need checking and revision.

These statements do not preclude the possibility of constructing much more adequately diagnostic tests of basic skills at the elementary school level than are at present available. They may have to be, in part, individually administered and otherwise rather time-consuming and complex for general use in school-wide testing, but they certainly could be a boon for small-group and individual testing and appraisal by the classroom and remedial-reading teacher. In this connection, the valiant efforts of the Committee on Diagnostic Reading Tests at the Junior and Senior High School levels may be cited (304, 342). The diagnostic tests proper are ordinarily preceded by a survey test, which the Committee has also developed, to "screen out" pupils to whom the diagnostic list should be administered in whole or in part. The survey test consists of three subtests: (1) to measure the pupils' usual rate and comprehension in reading interesting story-type materials, (2) to determine the extent of the pupils' vocabulary or knowledge of words in several different fields of reading, e.g., in general reading, in science, in grammar and literature, in mathematics, and in social science, and (3) to measure the pupils' comprehension of textbook materials in these various fields.

The diagnostic tests consist of four sections: Section I, in which the student's vocabulary in the above-mentioned fields is more reliably probed; Section II, in which the student's comprehension, in the fields of science, literature, and social science of (a) materials which he reads by himself and of (b) materials which are read to him is tested and compared. Section III, in

addition to measuring rate and comprehension in the above fields, has a part in which a pupil's usual rate and comprehension of simple story-type material is compared with his rate and comprehension when he tries to read much faster. The difference is taken to be a measure of the flexibility of the pupil's reading. Section IV concerns the pupil's skill in "word attack." One part is oral, in which his errors and methods of word attack and word recognition are studied. A second part is a (silent) group test of word recognition, of dividing words into syllables, and of using prefixes, suffixes, and roots in word attack. As for the time factor above mentioned, it takes in the neighborhood of four hours to give the entire battery of diagnostic tests, and forty minutes to give the survey test. Of course, as the Committee notes, after the screening with the survey test, only certain parts of the diagnostic tests may need to be given; that is, they need be given only where there are low scores in the survey test. This puts the initial diagnosis back on the survey test, the parts of which must, then, themselves have high reliabilities to serve this function.

A witty Scotchman, the late C. MacFie Campbell, once reminded an audience that "on one historical occasion a speech test was relied on as an infallible diagnostic criterion, and that whoever could not pronounce the word 'Shibboleth' satisfactorily was deemed an Ephraimite and was slain at the passage of the Jordan." And as Dr. Campbell added: "The victorious men of Gilead probably worried little over the fact that diagnostic mistakes may have occurred; the test gave much satisfaction because it was easy to apply, took up little time, and gave a clean-cut answer which did not require further thinking."

Diagnostic tests are at present easy to give, they are "scoreasy," take up little time, although for reliability they should in most cases take more, but they do require, for the present, further thinking and interpretation. When the diagnosis of the various skills of which reading is composed has become more clear-cut, definitive, and valid, the value of the diagnosis will still rest on the determination by teachers of the extent to which these various skills can be developed or advanced through instruction.

Individual Diagnostic Tests.—Before concluding this chapter, mention must be made of a different type of diagnostic test which is largely concerned with the more mechanical aspects of oral and silent reading and requires individual administration. Two excellent examples are the Gates Reading Diagnostic Tests and the Durrell Analysis of Reading Difficulty.

Gates Reading Diagnostic Tests (124). These tests examine in considerable detail the individual idiosyncrasies in oral and silent reading. For example, in the Gates test of oral reading, the omissions and additions of words, the repetitions and mispronunciations, the reversals of parts and wholes, and the wrong ordering of words, such as of wrong beginnings, wrong middles, and wrong endings, are made note of. Other tests are of word and phrase perception and analysis, spelling, and the reading of reversible words. Among the visual perception techniques sampled, are syllabication, recognition of syllables and of phonograms, the blending and the giving of letter sounds. Similarly, among the auditory techniques, are the blending of letter sounds, the giving of letters for sounds, and the initial and ending sounds of words.

Durrell Analysis of Reading Difficulty (91). The Durrell Test may well be preceded by the Durrell-Sullivan Reading Capacity and Achievement Tests (93) since they provide an ingenious bit of diagnosis to start with. It is customary in many schools to give group intelligence tests, and sometimes individual intelligence tests, along with the reading tests, to see if the reason a child is doing poorly in reading is his low intelligence, and also to see if pupils are "living up" to their intellectual capacities in their reading accomplishments. The Dearborn Group Tests of Intelligence (72) were, for example, originally developed for these very purposes and were therefore designed to be nonverbal in the early grades and partly verbal and partly nonverbal in the later grades. In Series II, e.g., the ability of the pupil to rearrange a series of disordered pictures so as "to tell the right story," is compared with his ability similarly to rearrange a series of disordered words so as also to tell

the right story.[8] The Durrell Sullivan Capacity Test is more specific and to the point. It inquires as to how well pupils understand words and sentences and paragraphs when read to them *orally,* and then takes these results as standards for what they should be able to read by themselves, with understanding, *silently.* So words are first dictated to the pupils, for which they are to find the appropriate pictures, and paragraphs are read to them, for which they have to choose, among several alternatives, *the* group of pictures which also rightly "tells the story." The achievement test which follows is then a silent reading test of word and paragraph meaning.

We have said so much about reliability and validity of tests that this is a good time to put the reader on his own. He will be left with the inquiry as to how valid and reliable a measure of the ability to read is the score, in the Durrell-Sullivan Capacity Test, for identifying pictures from the spoken words and that for choosing the correct sequence of pictures by the "tales that are told."

The Durrell Analysis of Reading Difficulty is concerned for the most part with similar measures as in the Gates Test, with some variations in substance and in technique. In the oral reading of phrases and sentences, is the trouble word-by-word reading, short eye-voice span, or enunciation? In the visual analysis of words, a tachistoscope is made use of, and the mechanics of silent reading are also observed in such matters as the use of the finger or pointer, the presence of lip movements, and the character of eye movements. Note is especially taken of individual differences in oral and written recall, study, spelling, and writing skills.

SUMMARY

We have now answered our original question as to the extent to which standardized tests of reading may check and supplement, or perchance revise, the teacher's appraisal of the

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[8] A better diagnosis of these matters can now be made in the case of group intelligence tests by the California Tests of Mental Maturity (California Test Bureau, Los Angeles, Calif.), and in the case of individual tests of intelligence by the Wechsler Intelligence Scale for Children (Psychological Corp., New York, N. Y.). Each of these tests provides a verbal or language I.Q. and a performance or nonverbal I.Q.

progress of pupils in learning to read.   When it is a question of whole classes being above, at, or below the age and grade standards, both the survey and the analytical or diagnostic tests may ordinarily be counted on to give trustworthy answers. There is thus safety in numbers.   In appraising the individual pupil's progress, it is well to remember that to err is human. Teachers are no exception to that rule, and tests are not infallible.   A common mistake, after a city-wide survey with a group test of intelligence and a single test of reading, is to conclude that, because, e.g., Johnny Jones has a low score in both, the one is the explanation of the other.   Neither test may be valid or reliable enough to reach such a conclusion.   When in doubt, a retesting with a different form of the test, or preferably with a somewhat different type of test, will make for more accurate appraisals in the individual case.

The analytical or diagnostic tests give worth-while information about some of the basic skills in reading and about many of the pupil's idiosyncracies in oral and silent reading.   The skills that are most commonly and adequately tested are (1) the pupil's vocabulary or knowledge of words, (2) his ability to get the literal meaning of sentences and paragraphs or to understand directly stated facts, and (3) to put together or hold in mind several ideas in a passage and to sense their relationships.   Less commonly tested are (1) the ability to get the main or central idea and to distinguish it from minor or irrelevant details, (2) the ability to follow and understand the organization of a passage, and (3) the ability to draw correct inferences and to go beyond the literal meaning to the implications of statements.   The findings from these and for some other still less commonly tested skills may be very suggestive to the alert teacher as to areas in which her instruction may have been lacking, or in which she may take pride in outstanding accomplishment.   Again, when it is a question of the accurate appraisal of the progress of some individual youngster, reliance on the findings of the test can be abetted by retesting with at least a different form of the test.

APPENDIX
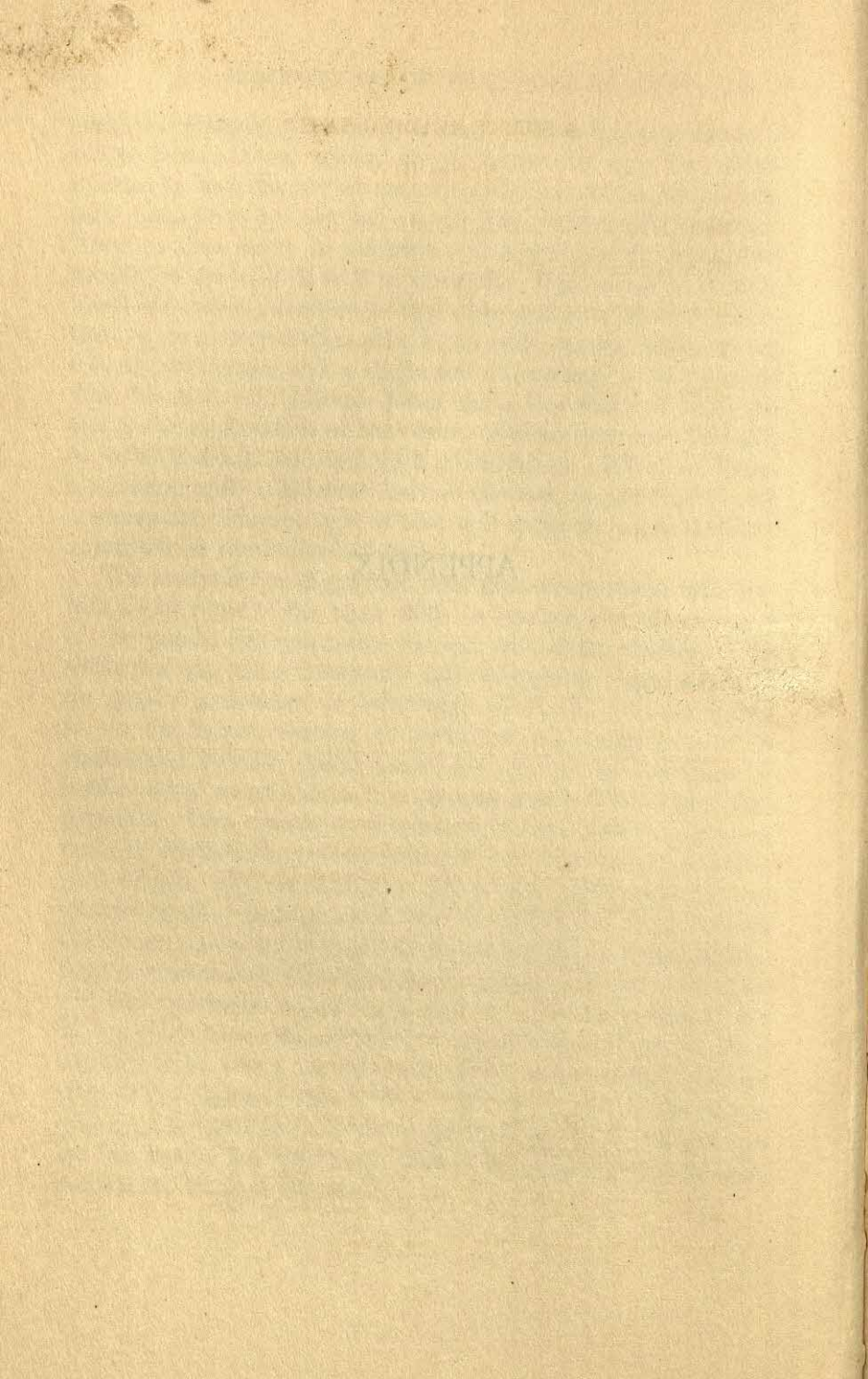
A SILENT READING TEST *

GRADES III–V

Name..

When is your birthday?...

How old were you your last birthday?..

Teacher...Grade ....

School ....Place ....

Date... Examiner...............................

	Score	R.A.	C.A.	R.Q.
Test 1		....	....	....
" 2		....	....	....
" 3		....	....	....
" 4		....	....	....
Total				

This is a story of an Indian, a hotel-keeper, and his gentleman guest. After you have read the story, we shall want to see if you can tell what it is about, and especially what the Indian did.

Many years ago, when there were but few white men in this country, an Indian went, in the dusk of the evening, to a hotel in a small village. He asked the hotel-keeper for some food and drink, but said that he could not pay for them then. He promised, however, to pay for them soon.

The hotel-keeper told him that he had nothing for him, and called him a lazy, good-for-nothing fellow. A gentleman, who was sitting by, saw that the Indian was weary and hungry; so he told the hotel-keeper to give the Indian what he needed and said that he would pay for it himself. When the Indian had finished his supper, he turned to the gentleman, thanked him, and told him that he would remember his kindness, and, whenever he was able, repay him.

Some years afterwards, the hotel-keeper and the gentleman set out to visit a distant city. On their way they were captured by an Indian party and carried to Canada. When they arrived there, some of the Indians advised that they be put to death, and others, that they be kept as prisoners. In the meantime, they were bound and kept safely, until the Indians could decide what to do with them.

One day one of the Indians came to the gentleman and unbound him. He then gave him a gun and a bag of food and said: "Follow me." They traveled for many days toward the south. In the day-time they shot such game as came in their way for food, and at night they kindled a fire and slept by it.

After a long journey they came one morning to the top of a hill, from which they could see a distant village. The Indian asked the man if he knew that place. He replied very eagerly that it was the village in which he lived.

His guide then reminded him that many years before he had bought food and drink for a weary and hungry Indian in that place, and added, "I am that Indian; now I pay you; go home."

Having said this, the Indian left him, and the man joyfully returned to his home. What became of the hotel-keeper was never known.

1

THE STORY RETOLD

Directions: All but the first letters of certain words have been left out where you see the dotted lines in the following sentences. Look at the following example and you will see that one word has been written in on each of the dotted lines. The words are *Indian* and *hotel*.

Example: An *Indian* went to a *hotel*.

Read each sentence carefully, think of what word belongs in each space, and then write in the missing letters on the dotted lines. Remember, write *only one* word in each space.

The Indian asked for f.................. and drink. He said that he could not p.............. for them then but promised to do so s.............. The hotel-keeper called the Indian l.............. and said that he had n.............. for him. A gentleman, who saw that the Indian was weary and h.............., offered to pay for the Indian's s.............. . The Indian t.............. the gentleman and said that he would remember his k.............. and repay him w.............. he was able. Some years afterward the gentleman and hotel-keeper were c.............. by Indians, who kept them b.............. until they could d.............. what to do with them. One day one of the I.............. unbound the g.............. and said, "F.............. me." After a long j.............. they saw, from the top of a hill, a d.............. village. The Indian had brought the gentleman back h.............. to r.............. him for his kindness.

Score = No. Right..................

2

Some of these pictures tell the story which you have just read and some do not. Put a C for correct on the right pictures, that is, those which tell the story and a cross (X) on the wrong ones, that is, those which do not tell the story. Put the C or the X in the little square or box in the lower left-hand corner of each picture.
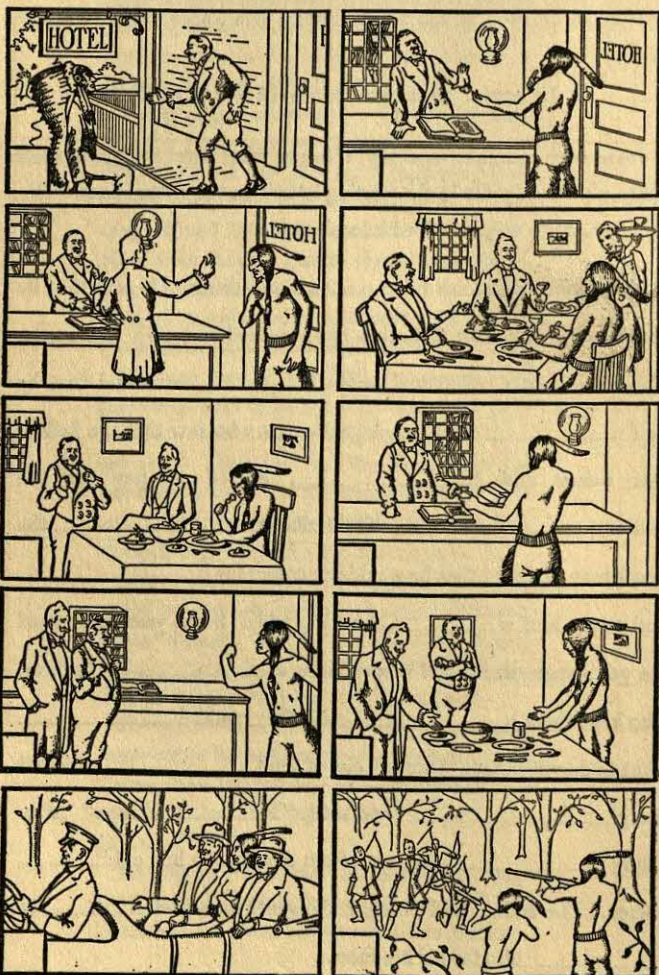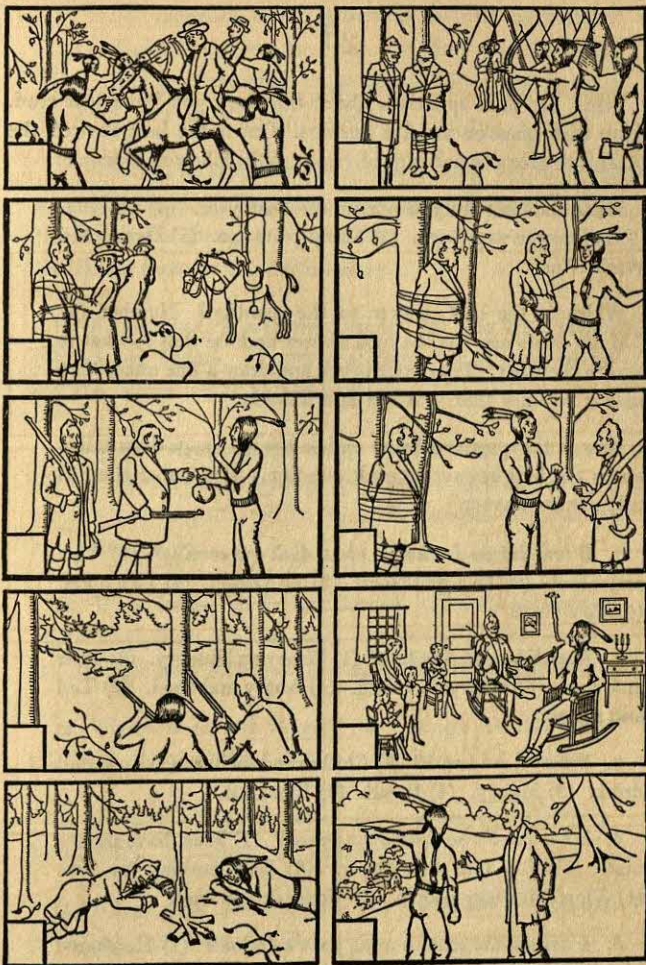
Right................Wrong................Score................

3

Below are some questions about the story you have just read. After each question are five answers. One is the best answer, the others are wrong or not as good. Look at the following example:

When did this story happen? (1) Last year. (2) In 1492. (3) Before you were born. (4) Many years ago. (5) During the World War.

Which is the best answer to the question? Number (4) "Many years ago" is the best answer because that is what it says in the story. Take your pencil and draw a line under that answer to show that it is the best answer.

Now in the questions below and on the next page draw a line *under* the best answer to each question. Remember there is only *one best* answer.

1. *Where did the Indian go about dusk one evening?* (1) To a restaurant. (2) To a gentleman. (3) To a camp. (4) To a hotel. (5) To a store.

2. *How did the Indian look?* (1) Weary and hungry. (2) Poor and lazy. (3) Weary and tired. (4) Angry and tired. (5) Tall and sinewy.

3. *For what did he ask?* (1) Clothes and shelter. (2) Food and drink. (3) Money. (4) Bread. (5) Breakfast.

4. *What was the hotel-keeper's answer?* (1) Must have money first. (2) Too late for supper. (3) Had nothing for him. (4) Didn't like lazy people. (5) Come in and wait.

5. *What did the gentleman do for the Indian?* (1) He shared his supper with him. (2) He gave him some bread. (3) He gave him his coat. (4) He paid for his meal. (5) He gave him five dollars.

6. *When the Indian finished eating what did he promise?* (1) To get even with the hotel-keeper. (2) To come back again. (3) To repay the gentleman. (4) To capture them both. (5) To thank the gentleman.

7. *What happened to the gentleman and the hotel-keeper?*
(1) The Indian took them for a ride. (2) They were shot by Indians. (3) They were lost in the woods. (4) They went hunting. (5) They were captured by Indians.

8. *What did the Indians advise doing with them?* (1) Bind them or set them free. (2) Keep them prisoners or kill them. (3) Rob them or scalp them. (4) Make them slaves or shoot them. (5) Thank them or give them money.

9. *Who helped the gentleman escape?* (1) The hotel-keeper. (2) An old Indian. (3) Some soldiers. (4) A poor squaw. (5) The Indian whom he had befriended.

10. *Why did the Indian bring the gentleman back home?* (1) Because he was in trouble. (2) Because he liked him. (3) Because he was good. (4) To repay his kindness. (5) Because he wanted money.

11. *What became of the hotel-keeper?* (1) It is not known. (2) He was left alone in the woods. (3) He was killed by Indians. (4) He came back alone. (5) He escaped from the Indians.

12. *Which word best describes the Indian in this story?* (1) Cruel. (2) Grateful. (3) Good. (4) Lazy. (5) Tired.

13. *What word best describes the hotel-keeper?* (1) Rich. (2) Unselfish. (3) Angry. (4) Unkind. (5) Bad.

14. *Which word best describes the gentleman?* (1) Good. (2) Happy. (3) Poor. (4) Forgiving. (5) Generous.

15. *What is the best name, or title, for the story?* (1) The Man and the Indian. (2) The Poor Indian. (3) The Grateful Indian. (4) A Fight with Indians. (5) A Hotel-keeper and his Guest.

No. Right.................x2 = score.................

There/were/few/white/peopleinthecountryatthattime

4

10	Onenightahungry Indianwenttoahotelandasked	10
9	forsupperHehadnomoneyandthehotelkeeper	19
9	refusedtogivehimfoodAgentlemanwhowassit-	28
8	tingnearbyofferedtopaythebillTheIndian	36
7	promisedtorepayhiskindnesssomedaySeveral	43
8	yearslaterthegentlemanandthehotelkeeperwere	51
8	capturedbysomeIndiansOneoftheIndiansset	59
9	thegentlemanfreebutleftthehotelkeepertohis	68
8	fateTheIndianandthemantraveledformany	76
11	daysTheyshotgameforfoodandmadeafiretosleep	87
13	byatnightAfteralongtimetheycametothetopofa	100
10	hillTheIndianaskedthemanifheknewthatplace	119
9	Themansaidveryeagerlythatitwasthevillage	129
10	whereheliveedThentheIndianlefthimandtheman	132
3	returnedtohishome.	

Right................. ÷ 2 = score...................

5

This is a story about an Indian, a hotel-keeper and a lady. The Indian asked the hotel-keeper for a horse.

Many years ago an Indian went to a hotel in New York. He asked the hotel-keeper for some money. The hotel-keeper called him a fine fellow. A gentleman, who was sitting by, told the hotel-keeper to give the Indian his coat. The Indian thanked the gentleman and told him that he would forget his kindness, whenever he was able to do so.

Some years afterwards, the hotel-keeper and the gentleman set out to visit a distant relative. On their way they were captured by an Indian party and kept as guests.

One day one of the Indians came to the gentleman and robbed him, and said "Chase me." After a long chase, they came one morning to the top of a hill from which they could see a policeman. The Indian asked the man if he knew that face. Having said this, the Indian left him and the man joyfully returned the compliment.

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